

11
54
NUMBER 78

JULY 1944

THE BULLETIN

OF THE

U. S. Army Medical Department

A periodical containing original articles, reviews, news, and
abstracts of interest to the Medical Department of the Army

ISSUED UNDER THE AUSPICES OF
THE OFFICE OF THE SURGEON GENERAL

**PUBLISHED MONTHLY AT THE MEDICAL FIELD SERVICE SCHOOL,
CARLISLE BARRACKS, PENNSYLVANIA**

By direction of the Secretary of War, the material contained herein is published as administrative information and is required for the proper transaction of the public business.

NORMAN T. KIRK
Major General, U. S. Army,
The Surgeon General.

NUMBER 78

JULY 1944

THE BULLETIN
OF THE
U. S. Army Medical Department

ISSUED MONTHLY

WAR DEPARTMENT
OFFICE OF THE SURGEON GENERAL,
WASHINGTON 25, D. C.

THE BULLETIN

OF THE

U. S. Army Medical Department

EDITORIAL STAFF

LIEUTENANT COLONEL JOHNSON F. HAMMOND, M. C., Editor
MR. GEORGE A. SCHEIRER, Managing Editor
MISS HELENA V. KAY, Assistant

EDITORIAL BOARD

BRIGADIER GENERAL CHARLES C. HILLMAN, U. S. ARMY,
Chief of Professional Service, Chairman
MAJOR GENERAL ROBERT H. MILLS, U. S. ARMY,
Consultant in Dentistry
BRIGADIER GENERAL RAYMOND A. KELSER, U. S. ARMY,
Consultant in Veterinary Medicine
BRIGADIER GENERAL HUGH J. MORGAN, U. S. ARMY,
Consultant in Medicine
BRIGADIER GENERAL FRED W. RANKIN, U. S. ARMY,
Consultant in Surgery
BRIGADIER GENERAL JAMES S. SIMMONS, U. S. ARMY,
Consultant in Preventive Medicine
COLONEL ALBERT H. SCHWICHTENBERG, M. C.,
Consultant in Aviation Medicine
COLONEL ESMOND R. LONG, M. C.,
Consultant in Tuberculosis
COLONEL AUGUSTUS THORNDIKE, M. C.,
Consultant in Reconditioning
COLONEL WILLIAM C. MENNINGER, M. C.,
Consultant in Neuropsychiatry

Subscriptions may be placed with the Book Shop, Medical Field Service
School, Carlisle Barracks, Pennsylvania.

Annual subscription: \$2.00; foreign subscription: \$2.50.
Single copies, domestic, 25 cents; foreign, 30 cents.

All other communications relating to this publication should be addressed
to The Surgeon General, U. S. Army, Washington 25, D. C.

Foreword

With the October 1943 issue, The Bulletin became a monthly periodical, instead of a quarterly, dedicated to keeping the personnel of the Medical Department informed on developments in war medicine. The new publication, known as The Bulletin of the U. S. Army Medical Department, absorbed the former quarterly dental and veterinary bulletins and will have material devoted to those fields in each issue.

The Bulletin is intended to be educational rather than directive in nature. It will contain the best information obtainable concerning military medical experience, observations, and procedure that may help to improve further the quality of professional services. The Bulletin will be a medium whereby experience gained in one theater of combat may be shared with those serving in other combat areas and with those in this country who are preparing for overseas duty. News items concerning military and scientific developments as well as original articles will be emphasized. The Bulletin, however, should not serve as a basis for the forwarding of requisitions for equipment or supplies referred to therein.

Obviously, some of the most interesting field experiences cannot be divulged in a periodical of this kind when our country is at war. The Bulletin will, however, publish that which can be safely told, drawing not only on current literature, but on many authoritative reports which reach The Surgeon General's Office from the field. Officers are invited to submit for publication reports of their field experiences that can profitably be shared with other officers.

The Medical Department has been commended for its work in caring for the sick and wounded in theaters of operations in war. The Bulletin will endeavor to stimulate such progress and to advance further the high standard of medical service in the Army of the United States.

Contents

NEWS AND COMMENT

	<i>Page</i>
Research on Prevention of Respiratory Diseases	1
Tropical Medicine Fellowships	2
Hookworm Infection in the Pacific Area	3
The Fourth Reconditioning Conference	4
Hospital Train in Australia	6
Patients Moved by Air	7
Social Adjustment of the War-Blinded	8
Dedicate Field Equipment Museum	9
Thermophilic Bacteria in Milk	11
The New Gas Casualty Set	12
Diagnostic and Registry Center for Fungous Diseases	15
The Current List of Medical Literature	15
Strength of Army Nurse Corps Increased	16
Early Postoperative Mobilization of Lower Extremities	17
Plague in the Netherlands East Indies	17
Method for Slide Culture of Fungi	18
Flies in Latrines	18
Board for Investigation and Control of Epidemic Diseases	19
Neurosyphilis Treatment and Disposition Centers	20
Maintenance of Medical Equipment	21
Cheese	22
Horse Breeding	23
Endemic Typhus Fever in 1943	24
Improvised Suction Apparatus	25
Litter Bearers Brought Down the Wounded	26
Results of Induction Station Examinations	27
Importance of Adequate Records of Induction Station Examinations..	29
Treatment of Sting of Jellyfish	31
Physiotherapy Clinic in the Jungle	32
Eight Nurses Awarded the Purple Heart	32
Device for Making Gauze Dressings	33
Re-pasteurized Milk	34
Army Nurse's Aides	34
Awards to Medical Department Personnel	35
Recent Directives and Publications Other Than S. G. O.	37
Improvised Water Heater	39
Broadcast on Psychoneurosis on March of Time	40
Interchange of Medical Knowledge	122

CORRESPONDENCE

Dentistry in the Chinese Army	42
A Hand-Washing Device	43

SPECIAL ARTICLES

CURRENT TRENDS IN MILITARY NEUROPSYCHIATRY	44
CLINICAL SIGNIFICANCE OF THE RH FACTOR	50
CLINICAL USES OF PRODUCTS MADE FROM HUMAN FIBRINOGEN AND THROMBIN	
Lieutenant Edgar A. Bering, Jr., M.C., U. S. N. R.	53

ORIGINAL ARTICLES

A STUDY OF PARACHUTE INJURIES	
Major C. Donald Lord, M.C., A. U. S., and	
Lieut. Colonel James W. Coutts, Inf., U. S. A.	57
COMPLICATIONS OF MENINGOCOCCIC INFECTIONS	
Captain Paul S. Strong, M.C., A. U. S., and	
Captain Joseph L. Hollander, M.C., A. U. S.	68
DIARRHEAL DISEASES IN U. S. TROOPS IN BELGIAN CONGO	
Captain Crawford D. Dunham, M. C., A. U. S., and	
Captain William H. Gillespie, M.C., A. U. S.	76
RECONDITIONING PROBLEM AT OLIVER GENERAL HOSPITAL	
Lieut. Colonel S. E. Bilik, M.C., A. U. S.	81
THE NEUROPSYCHIATRIST AND CONVALESCENT TRAINING PROGRAM OF ARMY AIR FORCES	
Major Albert A. Rosner, M.C., A. U. S.	93
SULFATHIAZOLE FOR THE PREVENTION OF GONORRHEA	
Major Paul G. Reque, M.C., A. U. S., and	
Lieut. Colonel Daniel Bergsma, M.C., A. U. S.	97
PREPARATION OF CULTURE MEDIA IN THE FIELD	
Lieut. Colonel Max Levine, Sn.C., A. U. S., and	
Captain A. H. Stock, M.C., A. U. S.	103
RELATION OF ANTISULFONAMIDE ACTION OF SERUM TO RESISTANCE TO SULFONAMIDE THERAPY	
First Lieut. Daniel A. Boroff, Sn.C., A. U. S.	111

APPARATUS AND CLINICAL NOTES

IMMOBILIZATION OF CERVICAL SPINE FOR TRANSPORTATION	
Major T. B. Quigley, M.C., A. U. S.	114
HERPES FOLLOWING FEVER THERAPY	
Captain Richard L. Sutton, Jr., M.C., A. U. S.	115
AN IMPROVISED FLUSH TOILET	
Lieut. Colonel Arthur G. King, M.C., A. U. S., and	
Lieut. Colonel Raulin B. Wight, C.E., A. U. S.	116
URETHRAL STONE IN A THOROUGHbred MARE	
First Lieut. John L. Putnam, V.C., A. U. S.	118
CONSTRUCTION OF A CONVALESCENT WALKER	
Captain Carl S. Bauman, M.A.C., A. U. S.	119
FULL LOWER IMPRESSION	
Captain Marc R. Carey, D.C., A. U. S.	120

Notice to Contributors

Contributions to The Bulletin should be typewritten, double spaced, with wide margins, and in duplicate including the original and one carbon copy. Great accuracy and completeness should be used in all references to literature, including the name of the author, title of article, name of periodical, with volume, page, and number—day of month if weekly—and year. Materials supplied for illustrations, if not original, should be accompanied by reference to the source and a statement as to whether or not reproduction has been authorized. Adequate legends should accompany each illustration in order to point out clearly to the reader the condition or lesion or other objectives, which in some instances should be indicated by a small arrow or other device. Each illustration and table should bear the author's name on the back; photographs should be clear and distinct; drawings should be made in black ink on white paper. Original articles will be accepted for publication on condition that they are contributed solely to The Bulletin and that editorial privilege is granted in preparing the material submitted for publication. Reprints may be ordered for official use. Arrangements for reprints for personal use may be made direct with the Book Shop, Medical Field Service School, Carlisle Barracks, Pennsylvania. The type will be held for two months following publication.

News and Comment

RESEARCH ON PREVENTION OF RESPIRATORY DISEASES

The War Department announced on 27 May the development of an oil treatment for bedding, blankets, and floors that is considered a major advance in preventing the spread of respiratory infections in barracks and hospital wards. This development was the result of extensive research carried out by medical scientists for The Surgeon General's Office. Dr. Oswald H. Robertson, of the Department of Medicine, University of Chicago, head of the Commission on Air-Borne Infections, Board for the Investigation and Control of Influenza and Other Epidemic Diseases, reported that tests covering 16,000 men at Camp Carson and Peterson Field indicate that respiratory ailments can be reduced 28 percent by keeping the floors of barracks oiled and soldiers' blankets impregnated with the invisible, odorless, nonsticky oil film. Oiling the floors of hospital wards decreased air-borne bacterial counts from 460 to 120 per cubic foot of air, a decrease of 74 percent. When both the floor and blankets in barracks were oiled, 97.2 percent of the bacteria formerly present in the air were trapped by the oil film. Dr. Robertson said that the oil film holds bacteria on such blankets as tightly as flypaper traps a fly. Tests with suction pumps proved it is very difficult to pull the microorganisms off the blankets.

Oiling ward and barrack floors is carried out simply by mopping. Treating the floors costs only \$6 per barrack and the treated floors will "trap germs" for four months. The oil treatment for blankets costs two cents a blanket and will last at least two months, which was the length of time of the present test period. Blankets thus treated are not sticky to touch.

Oil is applied to blankets in the final rinse of the laundering process. The oil film adds from 1 to 2 percent to the weight of blankets, makes them warmer, and leaves them unchanged in appearance, feel, or odor. Tests conducted at the National Bureau of Standards show that the oil treatment adds no additional fire hazard to the blankets.

TROPICAL MEDICINE FELLOWSHIPS*

Permission was obtained from The Surgeon General of the Army for instructors from medical schools to attend the eight-weeks course in tropical medicine at the Army Medical School in Washington, and Tulane University of Louisiana consented to give a course of similar length. Each medical school in the United States and Canada was offered the opportunity of sending one member of its teaching staff to each of these courses. The Markle Foundation made an appropriation of \$25,000 to the Association in order to provide traveling and living expenses and to pay the tuition at Tulane University. A supplementary appropriation of \$10,000 to continue this program was made by the Markle Foundation later in the year. A full-time secretary was employed to work with the chairman of the committee in carrying out the details of the program.

The first courses at the Army Medical School and Tulane University of Louisiana attended by medical school instructors began on 4 January 1943. Thirty individuals attended the Army Medical School course and twenty-nine attended the Tulane course. Subsequently, other instructors attended the courses at the Army Medical School at intervals of about two months, and Tulane University, with the consent of The Surgeon General's Office, reserved several places for medical school instructors in the two courses which it gave for medical officers of the Army. A total of eighty-four instructors have had the benefit of this program to date. . . . The 60 schools represented have included 52 of the 75 four-year schools and 8 of the 11 two-year schools. It is gratifying that 6 of the 10 Canadian schools took advantage of the program. A few schools which have not yet been able to release instructors to take an intramural course expect to do so during 1944. These individuals will attend the course which is continuing at the Army Medical School.

Both these intramural courses have been conducted with a very high degree of efficiency, and universal agreement as to their value has been expressed by those who have attended them. In the Army Medical School course some especially qualified instructors who have attended as students have also participated in the teaching. Many of the medical schools made immediate plans for the expansion and improvement of their teaching of parasitic and other tropical diseases. Some schools made arrangements for intensive reviews of these subjects by their fourth-year students before the end of the academic year in March 1943.

Shortly after the program for intramural courses was started, it was suggested to the committee by Colonel (now Brigadier General) James S. Simmons, director of the Division of Preventive Medicine of the Army, and by Mr. Archie S. Woods, of the Markle Foundation, that an opportunity should be

*Extract from report of Committee on Teaching of Tropical Medicine, by Dr. Henry E. Meleny, Prof. Malcolm H. Soule, and Dr. Hiram W. Kostmayer, published in *Journal of the Association of American Medical Colleges*, May 1944.

developed for medical school instructors to obtain a short period of practical experience in the American tropics. The Medical Department of the United Fruit Company offered the facilities of its hospitals in the Central American countries, and the Health and Sanitation Division of the Office of the Coordinator of Inter-American Affairs offered the cooperation of its local field units in those countries. The Pan-American Sanitary Bureau also offered to cooperate in any possible way. In February 1943, a group consisting of representatives of the Army, the National Research Council, the Markle Foundation, and the Association of American Medical Colleges visited Central America under the auspices of the Office of The Surgeon General of the Army to ascertain the most effective method of developing this program. As a result of this visit, a program was developed which received the approval of a conference on field experience in tropical medicine called by the Division of Medical Sciences of the National Research Council on 21 April 1943. Following this approval, the Markle Foundation appropriated \$35,000 to the Association of American Medical Colleges to make it possible for each medical school in the United States and Canada to send two instructors to the American tropics for a period of one month.

HOOKWORM INFECTION IN THE PACIFIC AREA

Hookworm infection has been fairly common in soldiers in the South and Southwest Pacific Theaters. Diagnoses have been based on the presence of eggs in stool specimens and the infections have been reported as being caused by *Necator americanus*. However, a hospital laboratory in the United States recently reported that worms identified as *Ancylostoma duodenale* were recovered following treatment of seven patients who had been exposed to infection in the Southwest Pacific Area. Consequently the possibility of infections by this species or mixed infections of *Ancylostoma* and *Necator* should be kept in mind. In general the effects of *Ancylostoma duodenale* on the host are more severe than those of *Necator americanus*.

One study overseas indicated that infection with hookworm was twice as common among infantry troops as it was in artillery troops from the same combat area. Foxholes and shelter trenches contaminated by natives were apparently a principal source of infection. It was not believed that many infections were acquired by soldiers going barefoot.

The most common symptoms associated with hookworm infection as seen in the theater were the lack of sense of well-being and abdominal discomfort and pain. Other symptoms sometimes associated with infection but difficult to evaluate were mental depression, mild anemia, and loss of weight. No instances of severe anemia, emaciation, or dependent edema were attributed to hookworms.

Eosinophilia was present in a majority of the cases. Eosinophil percentages ranged from normal to 77. The total leukocyte count was sometimes normal but usually was increased when eosinophil percentage was increased. One count of 48,000 leukocytes with 77 percent eosinophils was found. The brine flotation technique was the most useful method of demonstrating eggs in stool specimens.

In the South Pacific Area tetrachlorethylene or hexylresorcinol was favored as therapeutic agents, but in a certain percent of cases several re-treatments were necessary to eliminate all parasites. It has been the policy of the area to investigate and treat discovered cases of hookworm infection during periods of reconditioning.

THE FOURTH RECONDITIONING CONFERENCE

The reconditioning conference held at Lawson General Hospital, Atlanta, Georgia, 28-29 April 1944, was opened by Major General Frederick E. Uhl, who pointed out that the 4th Service Command has pioneered in the military reconditioning program, many of its hospitals having instituted educational and training measures for convalescent personnel before the War Department had established a reconditioning program throughout the Army. General Uhl said that since the goal of reconditioning is to return men to duty in the best condition in the quickest possible time, medical officers have a significant part to play in salvaging nonoperating personnel and thus holding down the need for replacements. Medical officers rebuild in patients confidence in their future and, while the war continues, in the rightness and necessity of our cause. Brigadier General Charles C. Hillman, chief of Professional Service in The Surgeon General's Office, pointed out that reconditioning is primarily a medical mission and requires medical supervision from beginning to end. It has a twofold purpose—that of restoring the physical condition and the mental health of the individual, in giving the individual an interest in resuming his military duties or in contributing to the war effort of the Army. The reconditioning program will require the enthusiasm, imagination, and sound judgment of the commanding officers of hospitals and of the reconditioning officers whose responsibility it is to make the most of local facilities which naturally will differ greatly in one location as compared with another. Colonel Augustus Thorndike, director of the Reconditioning Division in The Surgeon General's Office, said that the reconditioning program will accomplish much in reducing the hospital stay, if promptly and efficiently carried out, with class 3 and 4 patients. It will no longer permit the patient to experience periods of idleness of mind and body or to lose sight of the fact that he is a soldier; it will indoctrinate him with a will to serve until the war is ended. Major Arthur A. Esslinger, chief of the Physical Reconditioning Branch in The Surgeon General's Office, said that the entire reconditioning program is

predicated on the ward officer's approval of the activities administered to the patients. His sympathetic understanding is essential in the program, which must be adapted to the disability and needs of each patient and must promote and not retard recovery. Evidence is available that exercises can start much sooner and be much more strenuous than was believed desirable only a few years ago. Physical fitness includes five different aspects: freedom from defect or disease, strength, endurance, agility, coordination. These are the qualities which it is desired to have in patients when they are discharged for duty.

Major General Norman T. Kirk, The Surgeon General, briefly reviewed the development of reconditioning programs as he has observed them in various hospitals here and abroad. General Kirk pointed out that in getting reconditioning going, the man who has vision and drive will go ahead and do something about it, while those who have not will find excuses. The outlook now is hopeful, particularly for reconditioning trainees in classes 1 and 2. We must not lose sight of getting the patient well. The wounded man needs something before he gets reconditioned and that is important and must be done first.

Brigadier General W. W. Ervine, Office of the Assistant Chief of Staff, assured the conference of the wholehearted support of the G-3 Division in the reconditioning program. Colonel E. C. Lynch, G-1, who spoke in the absence of Major General Miller G. White, Assistant Chief of Staff, said that psychoneurotics are a matter of concern to the War Department. "We believe that such men should not be admitted as patients to general or station hospitals unless there is something else requiring hospitalization or unless psychoneurosis is so severe they should be hospitalized. We believe such men should be kept in uniform and put to work. It is difficult for the people in the field to realize that we are at the bottom of the manpower barrel. Every day you can cut off a man's stay in the hospital not only vacates a bed which a sicker patient may occupy but also gains for us additional work from an individual within the total strength of the Army."

Among other speakers were Prof. C. H. McCloy of the University of Iowa, consultant in reconditioning in The Surgeon General's Office; Major William S. Briscoe, chief of the Educational Branch of the Reconditioning Division; Mrs. Winifred Kahmann, chief of the Occupational Therapy Branch, Major Walter E. Barton, assistant director, Reconditioning Division, all of The Surgeon General's Office; Major Joseph Reed, of the Morale Services, A.S.F.; Lieut. Henry Kohn; Lieut. Colonel Lewis C. Shallenberger, chief of the Medical Services Division Personnel, 4th Service Command; Colonel Sanford W. French, Surgeon, Fourth Service Command; Captain Belford C. Blaine, Chief, Reconditioning Service, Lawson General Hospital; and Brig. General William L. Sheep, Commanding General of Lawson General Hospital.

HOSPITAL TRAIN IN AUSTRALIA

The purpose of a hospital train operating in Australia was to transport sick and wounded from one hospital to another over certain runs. The personnel of a portable surgical hospital was assigned to operate the hospital train which consisted of seven ward cars and six cars used for administrative purposes. While the personnel of the unit varied, efficient running of the train required about thirty enlisted men, three officers, and two nurses. From 1 April to 31 August 1943, the train traveled 18,861 miles and transported several thousand patients, some of whom were Australians. The actual days traveled during this period were 39½, while 113½ days were spent in various stabling areas. The portable hospital unit was relieved from duty with the train on 2 September 1943 and attached to another unit. Some of the difficulties encountered in operating the train were the water supply, which necessitated frequent stops for rewatering, the breaking of couplings between cars which became a source of danger for those on duty, and the soot, dirt, and coal dust which caused much concern, especially for patients with body casts, as soot and dust seeped between the cast and the skin of patients making them uncomfortable. Keeping the doors and windows closed and the use of screens did not prevent this from happening. During the longer trips, Red Cross representatives were present to supply various articles of food, tobacco, and reading material for the patients.



Hospital train, built by American Railway Service from Italian and German cars, loads at collecting point, Riardo, Italy, to evacuate the wounded. 15 February 1944. Signal Corps photograph.

PATIENTS MOVED BY AIR

The War Department announces that about 700 war casualties were moved by the Air Forces Air Transport Command to hospitals within the United States during a seven-day period ending 26 April, and that now the ATC will fly all war casualties moved by air within the United States. The expansion of air evacuation in this country has been stimulated by the crowded condition of railroads and the fact that fewer medical personnel are required. Pilots fly at altitudes below nine thousand feet, although fixed and portable oxygen systems are standard equipment. Twelve new C-47's are currently assigned to this domestic operation. Members of the Medical



Interior of cargo-carrying C-47 Douglas (DC-3) which has been converted into a hospital plane. Official photograph, U. S. Air Forces.

Air Evacuation Transport Squadrons assigned to Air Transport Command are based at Wilmington, Delaware, and Memphis, Tennessee. The usual medical crew on a domestic run is one flight nurse and one medical staff sergeant. The combat Air Forces outside the United States, the foreign wings of the Air Transport Command, and various air commands in the United States have done experimental work on this problem. In the last calendar year, 173,527 sick and wounded patients were evacuated by American military aircraft throughout the

world, and 3,260 sick and wounded have returned aboard ATC planes from war theaters to this country.

The air evacuation system makes it possible to fly a casualty from China, across India, Africa, and the Atlantic to the West Coast of the United States if medical necessity demands. The Command has lost only one patient as a result of air travel. Flight surgeons select the patients for the transoceanic hauls, and the patient's general fitness for air travel is the deciding factor. The four-motored C-54's fly from the United States to war theaters carrying priority cargo, mail, and passengers. They return as mercy ships, each carrying twenty-four patients.

SOCIAL ADJUSTMENT OF THE WAR-BLINDED

A center for training in social adjustment for war-blinded casualties of the Army and Navy will be established in the Avon School, Avon, Connecticut, which has been leased by the Government and renamed "Old Farms." Social adjustment training should begin as soon as possible after it has been determined that the patient is blind. Blindness will be said to exist when the best corrected vision in the better eye is less than 20/200. Such training is started therefore when the patient is admitted to a general hospital designated for medical or surgical treatment of war-blinded casualties. The preliminary adjustment training comprises such activities as walking, use of a cane, eating, shaving, and use of the braille watch and slate; it is continued until the patient receives the maximum hospital benefit; then he will be transferred as a patient to the center for such additional social adjustment training as is required.

While at Old Farms, patients will be instructed in various occupations and trades to determine that for which they are best fitted or toward which they show an inclination. A representative of the U. S. Veterans' Administration will be closely associated with the center. Thus when the patient is discharged from the service and transferred to the Veterans' Administration, a complete record and knowledge of his capabilities will be available and he may immediately begin training for his permanent vocation. On completion of the social adjustment training and discharge from the service and transfer to the Veterans' Administration, his pension will begin.

The staff at Old Farms will consist of 99 enlisted and 20 commissioned personnel, the latter including 3 nurses, 1 dietitian, and 1 physical therapist, also 47 civilian instructors, some of whom are blind. Colonel Frederic H. Thorne, M.C., will be in command. This property comprises 200 acres of land and 26 brick and stone buildings and has facilities for 200 men.

DEDICATE FIELD EQUIPMENT MUSEUM

A field equipment museum section has been established in the Medical Department Equipment Laboratory at the Medical Field Service School, Carlisle Barracks, Pennsylvania. At the dedication on 17 May, the principal address was given by Maj. Gen. George F. Lull, the Deputy Surgeon General. While a small museum of historical equipment has been in existence for several years, during the last two years it has been developed into an exhibit room, with new display cases and many valuable reconstructed models. New models and items of experimental equipment are being added from time to time.

In the equipment sample room in the museum are displayed most of the standard items of Medical Department field equipment. This exhibit was established for the purpose of instructing recently commissioned officers of the Medical Department, thousands of whom have completed the courses



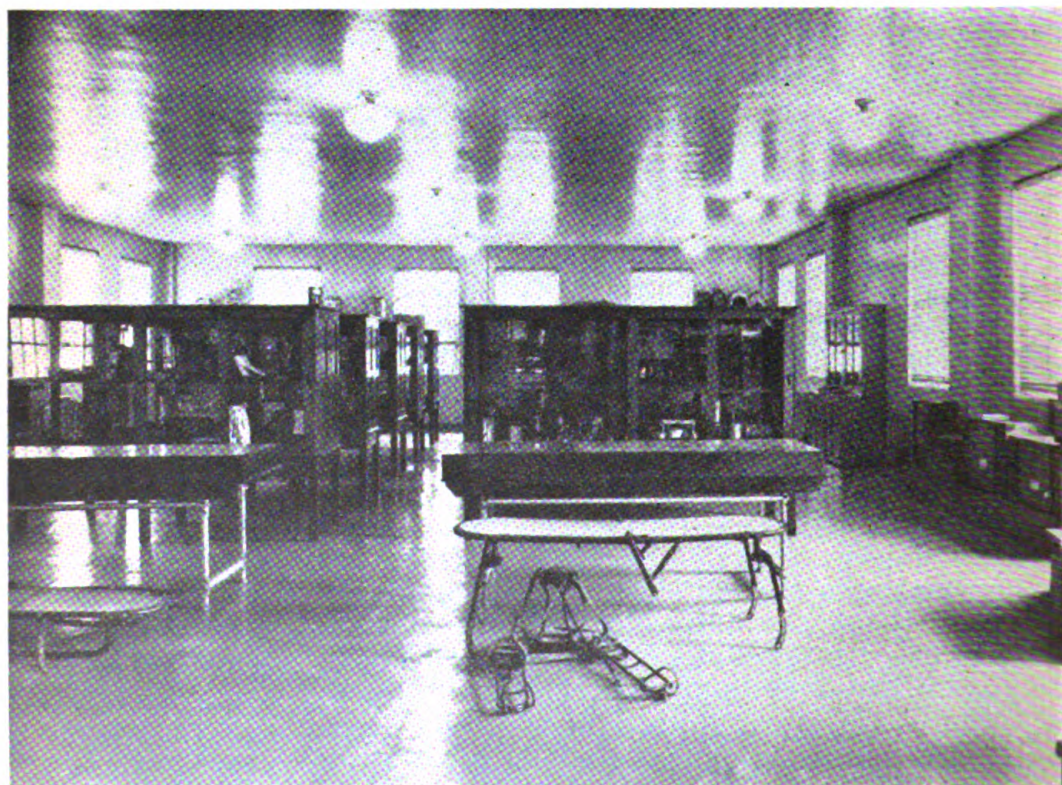
The museum and sample room is on the second floor, center, of this building at Carlisle Barracks.

at the Medical Field Service School. The sample room was established as a section of the Equipment Laboratory in order to make items of field equipment immediately available to the personnel of the laboratory when considering changes in drawings, design, or packaging, and also for comparative study in the development of new equipment.

This display is unique in that the contents of packages, kits, and chests are spread out in glass-topped cases with the chest or container being shown under the case. Each display is labeled in accordance with title and item number as given



Standard samples room.



Experimental equipment and model room.

in the Medical Department Supply Catalog. The display features all the various medical, dental, and veterinary field chests and kits and their contents, also pack equipment on pack saddles, Air Forces and Chemical Warfare medical equipment, x-ray units, and laboratory and field hospital equipment and supplies. On the walls of the room are framed pictures of the larger mobile units recently developed—surgical truck, mobile laboratories, dental operating truck, optical repair truck, field ambulances, and disinfectors. This display will be kept up to date by prompt requisition of new items and the removal of obsolete or discontinued items, those of the latter having historical interest being transferred to the museum section.

Brigadier General Addison D. Davis is the commanding general at Carlisle Barracks and Colonel Earle D. Quinnell, M. C., is the director of the Medical Department Equipment Laboratory.

THERMOPHILIC BACTERIA IN MILK

Some Army installations have trouble with high bacteria counts of milk due to "pin-point" colonies. Such colonies are usually due to the presence of thermophilic organisms in the milk. When these colonies appear, the trouble will most likely be found in the plant.

Thermophiles are present in raw milk in small numbers. They not only survive temperatures around 145° F. but develop rapidly at the pasteurizing temperature and reproduce between 131° F. and 167° F. Obviously, a cumulative contamination of equipment may take place in a pasteurizing plant unless the cleaning and sterilizing process is performed each day in such a manner as to destroy the organisms. Ordinarily if the equipment is properly cleaned, treated with a chlorine solution, or thoroughly steamed so that all parts are heated to 185° F., there should be little trouble with thermophiles. Under present conditions, however, the main cause for trouble with thermophiles is that plants frequently operate too long without stopping to clean up. Whether pin-point colonies are due to improper cleaning and bactericidal treatment, operating too long without stopping to clean up, or both, can readily be determined by taking samples, at regular intervals during the day, for bacteriologic examination.

From a sanitary standpoint, except as an indication of improper cleaning and sterilizing of equipment which may result in high counts, the presence of thermophilic organisms appears to be unimportant. No harmful effects have been reported due to the ingestion of these organisms. When encountered, however, the cause should be determined and corrected.

THE NEW GAS CASUALTY SET

The need for a lightweight unit and the development of better methods of treating gas casualties have led to the development of a new Gas Casualty Set, M-2, which is now in production and already has been distributed to some units in the field. The set (Med. Dept. Item No. 97756) is made up of the new Gas Casualty Treatment Kit and two inserts containing three impermeable aprons and three pairs of impermeable gloves. The set weighs about 45 pounds and may be carried on the back of the soldier.

The basic unit of this equipment is the Kit, Treatment, Gas Casualty (Med. Dept. Item No. 97767) which is an expendable item resembling in appearance a small suitcase and weighing 17 pounds. The kit may be carried by hand or as part of the Set, Gas Casualty, M-2, on the back of the soldier. The old Gas Casualty Chest weighed 160 pounds.

The contents of one Kit, Treatment, Gas Casualty, are believed sufficient to care for the chemical casualties of one infantry battalion for one day of active chemical warfare. The kit is made of plywood and has a rubber gasket lining the seam between the lid and the body. On the inside of the lid is a graphic representation of the contents of the kit, showing where each item belongs, and a booklet entitled, "Notes on Treatment of Casualties from Chemical Agents," which gives also the symptoms, pathology, and diagnosis of these cases. Attached also to the inside of the lid is a packet of discs containing flourescein and atropine tablets for the diagnosis and treatment of eye conditions.



FIGURE 1. The new set on soldier's back.

The body of the kit has five compartments (figure 2). For decontamination of the blister gases there are four tubes of M-4 Protective Ointment. For specific decontamination of the arsenical blister gases there are twelve tubes of BAL ointment and two bottles of BAL eye solution. Two bars of soap are present to aid in decontamination. To help relieve symptoms of burning, pain, and itching following exposure to blister gases, three cans of amyl salicylate solution are available in one of the compartments. For local treatment of burned areas due to blister gases, there are twenty-eight tubes of petrolatum. To help prevent or treat infection in burns, there are eight packages of 7.7-grain sulfadiazine tablets with eight tablets in each package.

There are also materials available for making a solution of calamine lotion with 1 percent phenol. There are four tubes of calamine concentrate, one of which is squeezed into a plastic bottle. Water is added to make the solution. This may be used for symptomatic treatment of itching skin due to blister gas burns.

To treat or prevent eye infections following injury by the blister gases, local instillation of sodium sulamyd should be carried out. This solution can be made up by mixing with water a packet of powdered sodium sulamyd (there are 25 such packets in the kit) in the 1-ounce drop-per bottle provided.

For emergency treatment in contaminations by white phosphorus, a 5 percent copper sulfate solution is available and a bottle of copper sulfate powder to make up more solution as needed. Included is a forceps for the removal of particles of white phosphorus.

There are two bottles of chloroform for frequent inhalations to relieve the symptoms produced by gases (irritant smokes) which cause vomiting. This treatment gives more relief than do inhalations of chlorine from a bleach powder bottle as formerly recommended. For congestion of the eyes or nose, due to gases, the instillation of "eye and nose drops" is recommended, and for such treatment four bottles of the solution (Med. Dept. Item No. 91091 are available.

The kit contains also 40 ampules of amyl nitrite for inhalation to combat the effects of hydrocyanic acid or cyanogen chloride.

The next item to be mentioned may seem complicated, but it is quite simple when the book of directions is followed. This item is the Kit, Water Testing, Screening, and its purpose is to provide small units with a simple device for screening out sources of water so contaminated with chemical agents that they cannot be made potable by the usual field treatment methods, such as chlorination in the Lyster bag.



FIGURE 2

(Army Medical Museum negative No. 79116)

The basis of issue of the Kit, Treatment, Gas Casualty, is as follows:

(Outside continental United States when authorized by the theater of operations commander)

- 2 per convalescent hospital; station hospital 25-450 bed inclusive; collecting company (troop).
- 3 per airborne medical company.
- 4 per general hospital; station hospital 500-900 bed inclusive; clearing company (troop); armored medical company; medical company, light division, evacuation hospital, semimobile; evacuation hospital.
- 12 per field hospital; auxiliary surgical group.
- 18 per medical battalion, engineer special brigade.
- 26 per medical gas treatment battalion.

The Set, Gas Casualty, M-2, is issued on the following basis:

(Outside continental United States when authorized by theater of operations commander)

- 1 per headquarters section, battalion section, divisional or nondivisional medical detachment; evacuation squadron, photographic squadron, reconnaissance squadron, or independent units having squadron aid equipment; medical detachment, commands, wing and Air Forces; medical dispensary aviation.
- 2 per portable surgical hospital.
- 3 per group, bomber, fighter, and troop carrier.
- 1 per training battalion, medical replacement training center.



Class practices first-aid treatment for gas burns after receiving small burns as a demonstration in Chemical Warfare School.

Other units which have better transportation facilities are issued the Kit, Treatment, Gas Casualty (Med. Dept. Item No. 97767) and the Gas Casualty Case, Aprons and Gloves (Med. Dept. Item No. 97758), the latter of which consists of 20 impermeable aprons and 20 pairs of impermeable gloves in a small blanket set case.

DIAGNOSTIC AND REGISTRY CENTER FOR FUNGOUS DISEASES

The group of workers studying fungous infections at Duke University has received a grant from the American Foundation of Tropical Medicine for the purpose of acting as a diagnostic and registry center for fungous diseases of man. The announcement in *Tropical Medicine News* outlines this service as follows:

1. Identification of fungi already isolated from patients suspected of having fungous disease.

2. Pathologic study and registry of biopsy and autopsy materials from patients suspected of having fungous infection. This is not to conflict with the diagnostic and registry services maintained by the several branches of the armed forces.

3. A complete set of cultures of pathogenic fungi will be sent on request to any medical school for use in teaching courses in tropical medicine. To guarantee arrival of the fungi in proper state for study, it is necessary that requests for this material be sent at least one month prior to the time that the cultures will be necessary for demonstration.

By special arrangement, serologic tests will be done in certain of the fungous infections, and vaccines for skin testing and therapeutic use in certain of the fungous infections will be sent on request.

Specimens for pathologic study should be sent to Dr. Roger D. Baker, Duke Hospital, Durham, N. C. All other requests will be handled through the office of Dr. D. T. Smith, Duke Hospital, Durham, N. C.

THE CURRENT LIST OF MEDICAL LITERATURE

The Current List of Medical Literature and microfilm copying constitute a novel plan by which medical research workers are promptly informed of studies in progress in all branches of medicine, and supplied without cost with microfilm copies of original communications which cannot readily be obtained otherwise. The weekly issue of the Current List contains the tables of contents of periodicals received by the Army Medical Library during the preceding one or two weeks. These are classified into fifty subdivisions of medicine; however, because of the composite character of most medical journals, many papers will be found under other headings than the one under which they rightly belong. The Current List permits the perusal of the tables of contents of a far larger number of journals than can be found in practically any other medical library. It should reveal, therefore, the existence of papers which might not be discovered. This exceptionally complete coverage of the literature permits one to take the fullest advantage of the work of all others. In addition, an index is being provided for each six months' volume of the Current List. The index differs from others in being classified in accordance with the principal subdivisions of medicine.

The Current List is a cooperative undertaking by the Army Medical Library, the Friends of the Army Medical Library, and the Medical Library Association. Its purpose, together with microfilm copying by the Photoduplication Service of the Army Medical Library, is to increase the use of the resources of the Library for the advancement of medicine. All income from subscriptions is used for the expenses of publication, distribution, and indexing. It is hoped that eventually the receipts will be sufficient to make the publication entirely self-supporting.

The Current List is sent without charge to medical units of our own and Allied army, navy, and air forces wherever located. The subscription price to individuals is \$5.00 per year. Microfilm copies of the Current List are sent by air mail to units in distant theaters not having sufficiently prompt postal service. The desired articles recorded in the Current List may be identified by the column number and position they occupy on each page and these designations used for ordering microfilms by air mail, telegraph, or radio.

Orders for the Current List should be sent to Medicofilm Service, Army Medical Library, and for microfilms to Photoduplication Service, Army Medical Library, Washington 25, D. C.

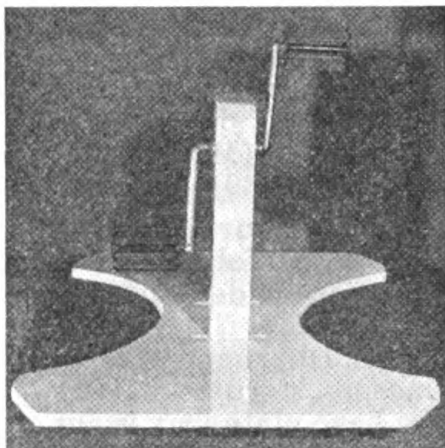
STRENGTH OF ARMY NURSE CORPS INCREASED

The War Department announced on 5 May that the authorized strength of the Army Nurse Corps has been established at 50,000, the increase being due to a larger number of hospital trains planned for service, added station and general hospitals, and the need for nurses aboard ships. The authorized strength of 50,000 is a ceiling. Actual appointment of nurses will be determined by the needs of the Army in relation to casualties and by the rate civilian nurses are declared available by the Procurement and Assignment Service of the War Manpower Commission. As nurses must undergo a period of training for duty with the Army, future requirements must be anticipated.

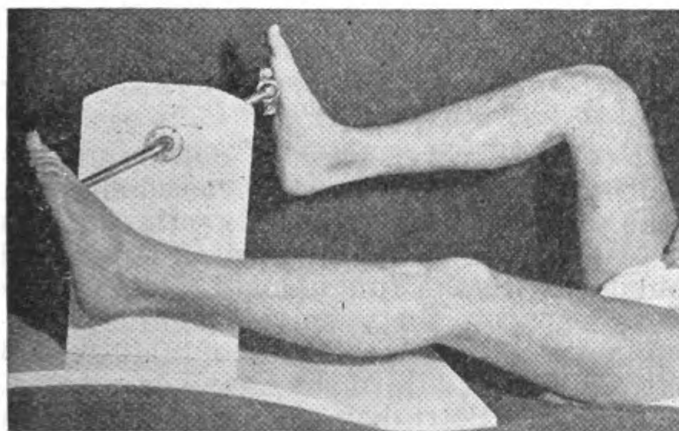
Major General Norman T. Kirk, The Surgeon General, in paying tribute to the Army Nurse Corps, said that "One medical officer with the aid of three nurses becomes four times as valuable in patient care. Nurses are trained to anticipate the doctor's needs in the treatment and care of patients, and every second of his valuable time can be utilized when nurses assist him. Much of the Medical Department's success with new drugs, such as penicillin and the sulfa drugs, has been due to the constant care and watchfulness of the Army nurse. Her ability and resourcefulness and her willingness to serve in all theaters under trying conditions has made a great difference in the recovery of sick and wounded soldiers."

EARLY POSTOPERATIVE MOBILIZATION OF LOWER EXTREMITIES

This apparatus for the early mobilization of the lower extremities of postoperative patients was constructed in the Occupational Therapy Section of the Birmingham General Hospital, Van Nuys, California, and is reported by Major James G. Dees, M.C., although it is not new and has been in use for a number of years. Major Dees reports its use on postoperative surgical patients as early as the second day following simple appendectomies. The period of use is gradually increased from one to ten minutes twice daily. In addition to lessening postoperative vascular complications, muscle tone and morale are improved; it is believed to be



Front view of apparatus.



Extension of left foot, dorsiflexion of right.

are fastened by small 1-in. wood screws to base and upright.

also a definite aid in the rehabilitation of many bed patients who are not surgical cases.

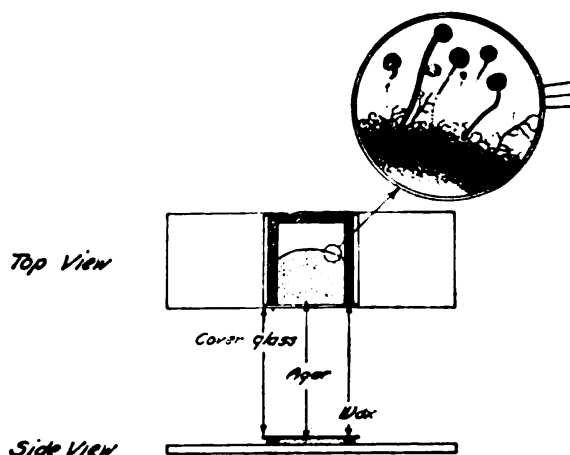
The materials used are $\frac{3}{4}$ -in. plywood 24 in. by 36 in.; center upright, 3 in. by 12 in. by 16 in.; 3 wood screws, 2 in. long through base into upright, and 4 small metal angle braces which

Plague in the Netherlands East Indies.—In recent years plague has occurred only in Java where it was first recorded in 1911. The last record of an epidemic in the Netherlands Indies outside of Java was in Makassar in 1922. The last epidemic in Sumatra was in 1920 at Palembang. The epidemics at Makassar and Palembang were both of short duration. However, in Java the disease is enzootic in the rat population in which it occasionally reaches epizootic proportions. In the regions of Java where housing is of such nature that the natives come into intimate contact with the rats, the rat plague epizootics are reflected as epidemics of human plague. (Farner, D. S.: *Epidemiology of Diseases of Military Importance in the Netherlands Indies*, Navmed. 133, 20 Aug. 1943. Washington: U. S. Government Printing Office.)

METHOD FOR SLIDE CULTURE OF FUNGI

An excellent method for slide culture for the rapid identification of fungi has been described,^{1 2} but the initial cost of the special slide devised by Dr. Brown makes its use in some laboratories prohibitive. Major Roger D. Reid, Sn.C., chief of the laboratory service at a station hospital, has adapted Brown's technique to an ordinary micro slide and coverslip, and 28-gage dental base plate wax (Med. Dept. Item No. 56730).

The culture chamber is made as follows: (1) The micro slide is passed through the flame of a Bunsen burner several times to sterilize it. (2) The base plate wax is cut with knife or razor blade to form three sides of a square the size of the cover glass. The width of the wax sides is to be about 2 mm. The slide is allowed to cool until warm to the touch and the wax placed on it. (3) The cover glass is quickly "sterilized" by passing rapidly through the flame and cooled slightly. It is then placed on the wax form and pressed gently to form a secure attachment to the slide and wax form. (4) Melted agar, at 50° C., inoculated with the fungus or material to be examined, is allowed to flow into the open side of the chamber with a capillary pipette until the cell is about 1/2 to 2/3 full. As the agar cools, the fourth side of the chamber is filled. (5) The slide is incubated in a Petri dish or in a bell jar with the humidity increased with moistened filter paper, cotton, or sponge. Within twenty-four to seventy-two hours excellent growth results which can be seen macroscopically. Rapid identification of fungi is thus made possible.



Diagnostic sketch of the culture chamber, with circular insert representing magnified growth of a fungus.

FLIES IN LATRINES

A formula which has been successfully used in destroying the larvae of flies in latrines has been submitted by Brig. General J. M. Willis, U. S. Army. The application of about 3 gal. to a forty-hole latrine destroys in twenty-four hours all evidence of breeding of flies. The formula consists of sodium arsenite, 4 lb.; molasses, 2 qt.; water, 40 gal.

1. Brown, J. Howard: A Micro Culture Slide for Fungi (Abstract), *J. Bact.*, Balt., 43:16, January 1942.

2. Brown, J. Howard: A Fungus Culture Slide, *Bull. Johns Hopkins Hosp.*, 70:460-462, May 1942.

Captain Victor Helman, Sn. C., provided the illustration.

**BOARD FOR INVESTIGATION AND CONTROL OF
EPIDEMIC DISEASES**

The Board for the Investigation and Control of Influenza and Other Epidemic Diseases in the Army completed its third year at the end of 1943. Organized by the Secretary of War on the recommendation of The Surgeon General, the board and its ten commissions, during the last calendar year, responded effectively to all requests for assistance made by The Surgeon General's Office and initiated a number of extensive epidemiologic investigations in the United States and in overseas theaters. The results of the last year's work have been of practical benefit to the Army and have increased scientific knowledge which has been shared with numerous agencies concerned with the study and control of infectious diseases among civilians and military forces. Members of the board and its commissions since 1941 have published 52 articles in medical and scientific journals, and an additional 30 manuscripts were released for publication in 1943. The bibliography comprising these papers is attached to the report of activities of the board for the year 1943 by the deputy chief of the Preventive Medicine Service of The Surgeon General's Office. Through the medium of the board and its commissions, the Office of The Surgeon General has available the services of 119 specialists in infectious diseases. These specialists hold appointments as consultants to the Secretary of War. The members of the central board are Dr. Francis G. Blake, President, and Drs. Oswald T. Avery, Alphonse R. Dochez, Ernest W. Goodpasture, Kenneth F. Maxcy, O. H. Perry Pepper, and Andrew J. Warren. Of the 119 consultants, all remained as civilians during 1943 except 6 who were commissioned in the Medical Corps under the special allotment of officers provided for the board. The office of the president of the central board is in New Haven, Connecticut, while the administrative office is in the Preventive Medicine Service of The Surgeon General's Office. The board has maintained extended contacts not only throughout The Surgeon General's Office, but with the offices of the Air Surgeon, the Ground Surgeon, surgeons of service commands, with posts and camps, with several overseas theaters, and with civilian institutions.

Investigations in which members of the central board participated during the past year include (1) troop housing, with relation to acute respiratory diseases; (2) the outbreak of jaundice in the Army; (3) bullis fever; (4) scrub typhus in New Guinea; (5) training in military and tropical diseases in Panama and along the Pan-American Highway.

Each of the ten commissions under the board was engaged in research at its home laboratories and in field investigations.

The deputy chief of the Preventive Medicine Service, Brig. General S. Bayne-Jones, submitted with the annual report to the chief of the Preventive Medicine Service, Brig. General James S. Simmons, a selective summary of the work of the commissions, some of which it may be possible to review briefly in future issues of The Bulletin.

NEUROSYPHILIS TREATMENT AND DISPOSITION CENTERS

A recent War Department Technical Bulletin (TB MED 48) sets up a program for the management of neurosyphilis in the Army. All soldiers with neurosyphilis of any type are transferred to designated general hospitals for diagnostic review and treatment. The diagnosis of neurosyphilis will be made originally in the field prior to transfer to the general hospital and will depend on evaluation of spinal fluid findings and the clinical picture. Because of the relatively short duration of infection of most soldiers with syphilis, it is expected that most neurosyphilitics will be of the asymptomatic type in which the spinal fluid is abnormal and neither symptomatic nor physical changes indicative of neurologic involvement are apparent. Those asymptomatic neurosyphilitics with minor spinal fluid changes, who may be expected to respond relatively quickly to antisyphilitic therapy, will be retained in military service but will be reclassified as temporarily unfit for duty overseas (W.D. Circular 100, dated 9 March 1944). Asymptomatic neurosyphilitics characterized by marked changes in the spinal fluid, and those with all other types of neurosyphilis, will be separated from the service after optimum treatment.

In general such treatment for neurosyphilitics who are to be separated from the service will be completed in not more than three months' hospitalization in one of the designated general hospitals. Fever treatment will constitute the basic therapy and malaria will be the preferred method of producing fever. Mechanical methods of fever therapy will be used alternatively when equipment and personnel are available. Chemotherapy will also be used but the nature of such treatment will depend on the individual case.

Asymptomatic neurosyphilitics with minor spinal fluid changes retained in the service because of the expectation of response to routine antisyphilitic therapy will be returned by the neurosyphilis center to their units for continuation of therapy on a duty status. If re-evaluation at the end of six months indicates failure of the patient to manifest expected improvement, the patient will be transferred again to the center for fever therapy and separation from the service. Prior to separation a complete case record of each patient will be forwarded to the U. S. Public Health Service in order that continued observation and treatment may be assured. This continued therapy and observation will be provided by civilian or governmental agencies, as the individual case may require.

MAINTENANCE OF MEDICAL EQUIPMENT

Until about a year ago the Medical Department was perhaps the least capable of the Technical Services in performing maintenance services on its equipment. There are several reasons. A large number of Army doctors were taken from civil practice, where operational maintenance was seldom performed. For centuries a doctor's equipment was limited to relatively simple items and when mechanical and electrical equipment came to be used maintenance was not considered part of his job and a service man was called. More recently, the delicate assemblies and highly specialized manufacturing procedures precluded extensive maintenance by the doctor. X-ray machines, for example, present difficulties representative of the maintenance problems in the Army Medical Department. Dozens of parts of x-ray machines are manufactured by different companies and assembled by another company. Parts which go wrong, especially tubes, must be returned to various manufacturers for repair, making centralization of maintenance activity very difficult.

There are now numerous types of medical equipment, from such items as knives and scissors on up to complicated machines, which can be maintained by Army personnel. In accordance with the Army Service Forces' program, the newly established Maintenance Division of the Medical Department has developed maintenance facilities to a great degree. This progress is signalized by technical manuals now being issued—TM 8-610, "Field Operating Lamp," and TM 8-611, "Surgical Instruments, Indirect Blood Transfusion Apparatus and Miscellaneous Surgical Supplies: Care and Maintenance." The thirty-three other manuals in process of preparation will deal with such field equipment as electrosurgical instruments, cardiographic equipment, and sterilizers. About six of these thirty-three manuals already are in manuscript form. The lists of spare parts now available for many types of medical equipment are invaluable in speeding up maintenance services.

An outstanding development in the Medical Department's maintenance program is the maintenance section of the St. Louis depot, which before the war consisted of a carpentry and paint shop. Anything higher than 1st echelon maintenance had to be performed by the manufacturer. Now, the St. Louis depot constitutes a 5th echelon shop which has taken over a great portion of normal maintenance requirements. Only 10 percent of the equipment needing repair now goes back to the manufacturer. Equipment in all stages of disrepair is completely reconditioned before going back into service.

The nature of medical equipment makes it almost impossible to set up maintenance procedures on the regulation 5-echelon system. Maintenance work usually is in the nature of 1st or 5th echelon repairs. The few repairs in the 2d and 3d echelon class can be taken care of in the Army's combined shops.

The St. Louis depot, in line with the new maintenance program, is also a training school. A sixteen-week course is given, including instruction on x-ray equipment, sterilizers, and optical equipment. Men selected for the course must have previous experience or training in the subjects to be studied, and they are trained for particular maintenance jobs. Along with the St. Louis operation, six distribution depots act as clearing points for equipment coming in for repairs or replacements. All requisitions from the field pass through these distribution points. The medical equipment liaison officer assigned to each of these distribution depots makes regular inspection trips to hospitals and other medical installations in the distribution area served by the depot. If an x-ray machine in a station hospital goes out of commission, a liaison officer may be sent to the scene, taking with him spare parts to make repairs on the spot. The liaison officer may also check all other equipment in that hospital.

A big timesaver is the Medical Department's portable optical repair unit. While optical repair shops are set up in various theaters, there is great need for portable units, which frequently save weeks in transporting items to and from repair shops. Where portable units operate, a man can get new glasses in hours instead of days. The number of portable units in the field is being increased as rapidly as possible. Numerous other improvements will be made as time goes on; meanwhile, with facilities in their present state, the Medical Department has an efficient maintenance procedure, and another contribution to the cause of efficient operation has been made by the Army.

CHEESE

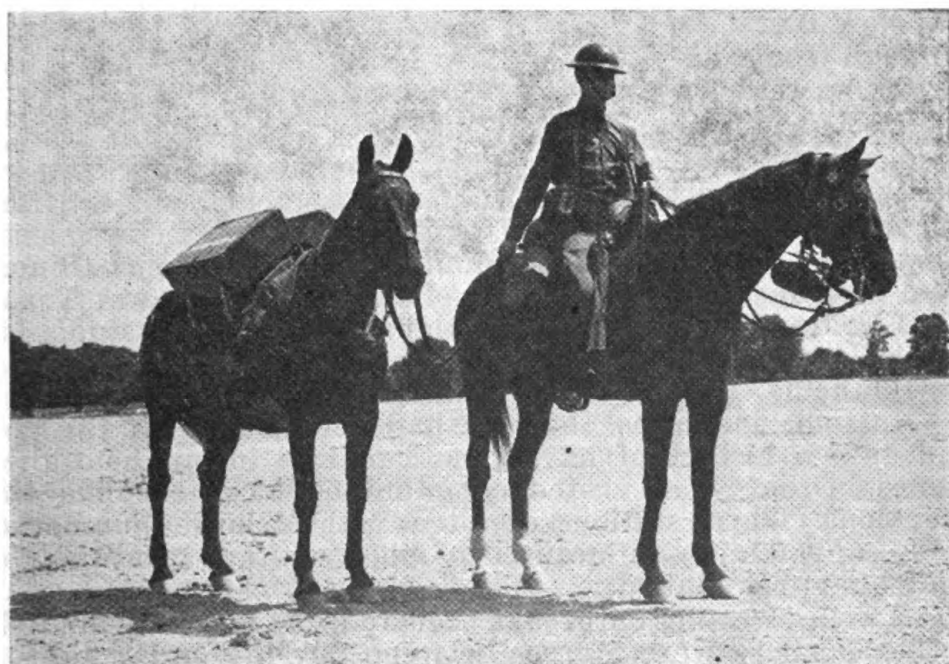
Commercial manufacturers processed and packed in domestic and export boxes 6,500,000 pounds of cheese from 15 October 1943 until 1 April 1944. The cheese was processed from lots of Cheddars which had been purchased and inspected during the summer cheese-storing program. The cheese was processed under supervision of the Army Veterinary Corps in accordance with Tentative Specification CQD 91 and 91a, and, because of the fact that this cheese was primarily aged Cheddars of good quality, a product was obtained which was far superior in flavor and body to the average processed American Cheddar found on the market. Because of the success of this processing program and because of the susceptibility to deterioration and vermin infestation of natural Cheddars when shipped overseas, it was decided by O.Q.M.G. to process and can most of the cheese used for overseas shipment. Contracts have been let to process 6,552,000 pounds by the end of June. This cheese will be packed in 7-lb. tin cans, packed 6 cans to a case, in solid-fiber, wire-bound boxes; 60 percent selected and graded green cheese is being bought and blended with aged cheese which has been stored since last summer. By so doing, a cheese superior in flavor and body is

obtained, in contrast to processed cheese where the processor is permitted to use green and undergrade cheese of questionable soundness and from unknown sources. This product is more satisfactory for overseas use in that it can be shipped without refrigeration and will not require added protection from vermin. All canned process cheese is being prepared under the supervision of the Veterinary Corps.

HORSE BREEDING

The Army Horse Breeding Plan conducted by the Remount Division of the Quartermaster Corps resulted in a total of 11,066 foals produced in 1943. Of this number, 10,551 were sired by thoroughbred stallions, 264 by Arabian, and 31 by American Saddle Horse stallions. There was about a 20 percent reduction in the breeding program last year compared with the average for the three previous years. There were 14,349 mares bred to 604 Army stallions with a normal expectancy of a 1944 crop of about 8,600 foals. The downward trend in the breeding program has resulted from several factors, including the farm manpower shortage which, in turn, has caused stockmen to arrange to have only their best-producing mares bred.

The primary object of the Army Horse Breeding Plan is to assist in the general improvement of the type and quality of light horses. The Remount service supplies breeders with services of blooded stallions through selected agents in the Remount areas. A small fee is charged and the foals produced are the property of the owners of the mares.



Pack horse loaded with veterinary supplies. Signal Corps photograph.

ENDEMIC TYPHUS FEVER IN 1943

The Surgeon General's Office secures case histories on cases of typhus fever reported from posts and stations in the United States. Request is also made for blood specimens to be submitted to the Division of Virus and Rickettsial Diseases, Army Medical School, where complement fixation and Weil-Felix reactions are performed. A tabulation of the cases reported in 1943 has been made. This summary excludes the small number of cases on whom no histories were received, those erroneously reported, and those whose histories and laboratory findings were felt to be decidedly inconsistent with the diagnosis. These last were very few. Of 137 cases reported on WD MD Form 86ab, 120 were included in the tabulation. Because of the selection of cases, tabulation by dates of onset rather than of hospitalization, and probable failure to report some cases, these figures may differ slightly from those recorded at the individual stations.

While cases occurred throughout the year, the highest incidence was in August, with considerable numbers continuing through October. All but 4 of the cases occurred in either the Fourth or Eighth

Incidence of endemic typhus fever, 1943

Month	IV Service Command	VIII Service Command	Other	Total U. S.
January	1	4		5
February	1	3		4
March	2	3		5
April	1	1		2
May	3	4		7
June	4	3		7
July	2	8	1	11
August	13	8		21
September	18	—	1	19
October	10	6	1	17
November	6	5	1	12
December	6	4		10
Year	67	49	4	120

Service Command, 67 being from the Fourth and 49 from the Eighth, of which 42 were in Texas. One case was admitted to the Bronx Area Station Hospital, New York, on furlough from Florida; 2 who were hospitalized at Mitchel Field, New York, came from Georgia, and from Nashville,

Tennessee; the fourth was admitted to Scott Field, Illinois, from Florida. The incidence by states was as follows: Texas, 42; Florida, 16; Georgia, 15; Alabama, 13; Mississippi, 12; South Carolina, 9; Louisiana, 6; New York, 3; North Carolina, 1; Oklahoma, 1; Tennessee, 1; and Illinois, 1.

In some instances, the men had been living off the post and gave a history of having noticed rats in or about their homes. Others had visited communities where typhus was prevalent. Thus, stations credited with a large number of cases cannot fairly be accused of poor sanitary conditions or inadequate rat control.

Two interesting outbreaks occurred. At an Army air field in Texas, there were 5 cases between 20 May and 8 June, a period of twenty days. Nothing was said in the reports re-

ceived as to any common factor in their habits or exposure. At an Army air field in Georgia, 9 cases, one of which was hospitalized elsewhere, occurred in the eighteen days between 24 August and 10 September. In 7 of these, it was stated that the soldiers had visited a "juke joint" where the proprietor and his wife had recently suffered from typhus fever. The sequence of cases by dates of onset in this outbreak was as follows: 24 August, 25 August, 26 August, 27 August (2 cases), 28 August, 3 September, 6 September, 10 September.

So far as could be determined, all of the 120 patients recovered. One death not included in these tabulations occurred in an individual who was taken off a troop train in California in a moribund condition and on whom an adequate history was unobtainable. This patient had a positive Weil-Felix reaction, and pathologic findings established the diagnosis of a rickettsial disease, but whether the case was one of epidemic typhus, endemic typhus, or Rocky Mountain spotted fever could not be determined. The onset of disease was in January 1943 and the soldier's home station was in Washington.

Comparison of the results of Weil-Felix tests performed by station hospital or service command laboratories and those done by the Division of Virus and Rickettsial Diseases, Army Medical School, suggests that the local laboratory findings are quite reliable. Of these 120 cases, specimens from 91 cases were sent to the Division of Virus and Rickettsial Diseases. All of these gave a positive murine complement fixation test. It is recommended that 5 cc. of sterile serum be sent to the Army Medical School from every suspected case. Specimens should be obtained as early in the disease as possible and then every five days until patient is discharged.

IMPROVISED SUCTION APPARATUS

At an evacuation hospital in the China-Burma-India Theater where originally no kind of suction apparatus could be obtained, the first and only anesthetic death was the stimulus for devising quickly a method of aspiration. The Chinese patient had a ruptured spleen resulting from a kick by a horse. During the second stage of the inhalation anesthesia preliminary to surgical operation, the patient vomited "several bowlfuls of rice," some of which he aspirated into the trachea. In spite of attempts to remove the column of rice by means of a laryngoscope and forceps, he failed to recover from the asphyxia. Following this incident, Capt. Edward Damarjian, M. C., in a paper on "Anesthesia in the Tropics" in the *Field Medical Bulletin*, Headquarters, S.O.S., U. S. Army Forces, China-Burma-India, May 1944, writes that a suction method was promptly devised. A long piece of rubber tubing was attached to the intake manifold at the site of the windshield wiper connection on one of the hospital ambulances. The vehicle was then parked close to the hospital window and, with the motor running, suction could be obtained sufficient

for any need. The rubber tubing was interrupted close to the patient and a flask with a two-hole rubber stopper interposed to catch the overflow. This device was found satisfactory; however, as the vomitus of Chinese patients consists usually of globules of congealed dry rice, it is sucked out with difficulty. Some trouble was encountered also in attempting to wash out their stomachs with a Levin tube because of its small caliber.

LITTER BEARERS BROUGHT DOWN THE WOUNDED

The War Department, Bureau of Public Relations, on 24 May released a statement by Lieut. Colonel Robert B. Neely, Field Artillery, who recently returned to the United States from service with the 34th Infantry Division of the Fifth Army in Italy. Among other experiences mentioned is that of a regiment that held one summit of Mt. Pansano for six days of fog, rain, and snow by scaling one frosty knob after the other and repulsing the Nazis at point-blank range. Heights were climbed that rose at an angle of 60° near the crest. To hold this hill the regiment expended 2,400 hand grenades, 5,000 mortar shells, and 6,900 rounds of 75-mm. ammunition for the cannon company, not including thousands of rounds used by supporting artillery.

Before the battle was over, the hill was bare of trees and bushes that grew there and was dotted with fallen American and Nazi soldiers. Litter bearers brought down the wounded. Eight men, four standing on each side of the steep, muddy trail, holding their burden over their heads, passing it down from man to man, and twelve hours were required to evacuate a single casualty to the aid station at the foot of the hill.



Handing a loaded litter up a 60-degree slope on Guadalcanal. Ropes strung between trees help the litter bearers. A litter crew can work only 30 to 50 yards without relief. Signal Corps photograph.

RESULTS OF INDUCTION STATION EXAMINATIONS

The Office of The Surgeon General has completed a review of the 1943 results of examinations of selectees at the joint Army and Navy induction stations. The men who came up for examination at induction stations had already been screened by the local boards. During 1943 about 6 percent of the selectees were rejected by the local boards for manifestly disqualifying defects.

The rejection rate at induction stations increased during 1943 for white selectees from about 25 percent in January to about 38 percent in December; for colored selectees the corresponding figures were 44 percent in January and 57 percent in December.

Among the disqualifying mental defects were psychoses, psychoneuroses, personality inadequacies, and mental deficiency. Prior to 1 June 1943 the number of illiterates who could be inducted was limited and those in excess of quota were usually reported as mental rejections. Since 1 June 1943 all illiterates who otherwise qualified for general service have been accepted if able to pass specially designed qualification tests; those failing these tests have been considered as mentally deficient together with men so diagnosed by psychiatrists.

The principal factor in the rise of the rejection rate during 1943 was the increase in rejections for disqualifying mental defects. For white selectees mental rejections rose from about 7 percent of those examined in January to about 14 percent in December and for colored selectees the rate increased from 24 percent to 32 percent. Recognition of the problems created by the induction of men having, or predisposed to, psychiatric disorders led to increased emphasis on the need for careful psychiatric screening.

Another factor in the rise of the rejection rate for mental defects was a more intensive reworking of the 4-F pool by the local boards. It is believed that men previously rejected for the milder psychiatric disorders may have been called up for re-examination with greater frequency than men rejected for other disqualifying defects. The removal in June of all restrictions on the number of illiterates who could be inducted is also believed to have resulted, for a time at least, in an increased rejection rate. This was probably due to the unloading by local boards of large numbers of illiterates many of whom failed to pass the specially designed qualification tests.

Reports for the last three months of 1943 indicate that about one-quarter of all mental rejections among white selectees were ascribed to mental deficiency and almost two-thirds of all mental rejections among colored selectees were attributed to this cause.

The relative importance of the various classes of disqualifying physical defects during 1943 was as follows:

Rejected for physical defects during 1943

Cause of rejection	White selectees	Colored selectees
Musculo-skeletal	3.0 percent	2.6 percent
Cardiovascular	2.7	4.2
Ear, nose, and throat	2.4	.6
Eyes	2.0	1.8
Hernia	1.5	1.3
Neurologic	1.2	1.9
Pulmonary tuberculosis	1.1	1.1
Genito-urinary	1.1	1.1
Respiratory (other than tuberculosis)	.9	.9
Feet	.8	1.8
Gastro-intestinal	.7	.3
Syphilis	.3	1.3
Teeth	.1	.1
All other physical defects	2.4	2.0
Total rejected for physical defects	20.2	21.0

Increases occurred during the year in the rejection rates for musculo-skeletal and cardiovascular defects, flat feet, and syphilis, among both white and colored selectees. Among white selectees the rejection rate for gastro-intestinal defects also increased.

Rejections for syphilis include largely cases of cardiovascular, cerebrospinal, or visceral syphilis. The increase in the rejection rate for syphilis is directly traceable to the increased emphasis on induction of selectees with syphilis to the fullest extent consistent with treatment facilities. The Selective Service System cooperated in this respect by sending up for induction the backlog of eligible physically fit individuals previously rejected for syphilis.

During 1943 there was a general reworking by local boards of previously rejected men and this operated to increase rejection rates. Special studies were made of various causes for rejection to determine if any of the men rejected because of particular defects could be considered fit for service. One study of cardiovascular rejections was reported in the 11 December 1943 issue of the *Journal of the American Medical Association* under the title "Report of Re-examination of 4,994 Men Disqualified for General Military Service." Generally, it was not found possible to salvage more than a small proportion of those rejected. In November 1943 the Army began to accept men (for limited service) with inguinal hernia which had not descended into the scrotum, so that the rejection rate from this condition has begun to show a decline.

An analysis of rejections by age for the period April through June 1943 shows that the rejection rate increases sharply with advancing age. This is true for both mental and physical defects and for both white and colored selectees.

IMPORTANCE OF ADEQUATE RECORDS OF INDUCTION STATION EXAMINATIONS

In a previous issue¹ attention was called to the unwarranted expense resulting from pensions in cases where the disability existed prior to military service. The adjudication which authorizes a pension in these cases is not the result of carelessness or undue liberality in the Veterans' Administration rating boards; it is the consequence of the pension law, which assumes that defects unrecorded at the time of an induction physical examination must not have existed at that time.

Army Regulations² recognize the responsibility of the examining physicians and quote directly from Veterans' Regulations. Previously these provided that "every person employed in the active military or naval service for six months or more shall be taken to have been in sound condition when examined, accepted and enrolled for service, except as to defects, infirmities, or disorders noted at time of the examination, acceptance, and enrollment, or where evidence or medical judgment is such as to warrant a finding that the disease or injury existed prior to acceptance and enrollment." Present Veterans' Regulations are in accordance with Public Law 144, 78th Congress, which makes the same provisions, except that a time limit is not specified, the words "clear and unmistakable evidence demonstrates" are substituted for "evidence or medical judgment is such as to warrant a finding," and the clause "and was not aggravated by such active military or naval service" is added. A forthcoming revision of AR 40-1025 will make note of the changes. Pending its issue, instructions to be followed in determining line of duty have been issued in War Department Circular No. 205, 24 May 1944. This circular emphasizes the fact that length of service *per se* is no longer a decisive factor and adds "it will be borne in mind that medical judgment alone, as distinguished from well-established medical principles, will not be considered sufficient to rebut the presumption of the patient's sound condition at the time of entrance into active military service."

This directive, based on the rigid requirement of Public Law 144 places a heavy responsibility on examining officers and civilian physicians at induction stations, and on medical officers at installations where line of duty determination is made in cases of discharge on certificate of disability. When examining physicians at induction stations are negligent in taking histories, and in the thoroughness of the examination and in properly recording the defects found, the full weight of this negligence falls on the medical officers concerned with discharge, for they must, in the future, determine the line of duty status on the basis of "clear and unmistakable evidence" rather than the exercise of their best

1. Vokoun, Frank J.: Lessons Learned from Pension Rating Boards, Bull. U. S. Army M. Dept., 77:113, June 1944.

2. Army Regulations 40-1025, Records of Morbidity and Mortality, C 1, paragraph 18a, 21 August 1942. Washington: U. S. Government Printing Office.

judgment. While medical evidence may be adequate to determine the facts in a high proportion of cases, there are many cases in which the truth can be determined only by a convincing record of the entrance examination. In the absence of such an adequate record, the cases is resolved by granting line of duty status. There is reason to believe that in a large number of cases, were the real facts available in the initial record, the Government could be saved unjustified expense.

The difficulties and responsibility of induction stations are serious. The examination must be made rapidly, thus possibly preventing proper attention to the history and to the notation of defects actually recognized. More familiarity of examining physicians with discharge procedure would engender greater caution and a more anticipatory attitude toward the consequences of inadequate records.

The difficulty of the examining physician is further increased by his constant need to distinguish between what is claimed to be important and what seems to be trivial and to weigh the significance of a volunteered history of disease against the absence of substantiating physical signs or other objective evidence. An unsubstantiated history may appear to be an effort to escape military service and for this reason be not recorded. A study of discharges reveals, however, many cases of discharge for physical defects which were the cause of disability in civil life and treated by private or institutional medical care, but not recorded in the induction form in spite of a proffered full history at the time of induction. Common among such conditions are asthma, tuberculosis, and rheumatic fever. The longer the interval between acceptance and discharge, the heavier the load on medical judgment in determining the line of duty status. A history of antecedent medical treatment, which was freely offered at the time of induction, is not always volunteered at the time of medical discharge.

The obvious remedy of this serious situation is greater care in examination, constant attention to detail, and a clear written record of defects considered acceptable and of the history given of previously existing disease. An example of carelessness in the first respect is the fact that one of the commonest malignant tumors found in enlisted men after induction in the Army is embryoma of the testis. An example of lack of care in the last respect named is the fact that not a few men discharged because of tuberculosis have a history of previous residence in a sanatorium for this disease.

Induction stations are responsible for inducting a sufficient number of troops to win the war. A proper perspective will be maintained if it is always kept in mind that a careless record at induction may cost the present and future generations a fortune.

TREATMENT OF STING OF JELLYFISH

The sting of the jellyfish can be very dangerous, especially when it occurs in tropical waters. The sting is produced by thousands of nematocysts on the tentacles from which a tiny barb protrudes when a trigger hair is touched and penetrates the outer layer of the skin. The nature of the toxic substance injected by the animal is not well understood. The effect of contact with jellyfish in tropical waters is more serious than the effect produced in temperate waters in which the sting usually is merely painful. In cases reported from the tropics, the symptoms have been practically uniform. In the March 1943 *United States Naval Medical Bulletin*, Stuart and Slagle review the usual symptoms in the tropical cases; they are spasm of the respiratory muscles leading to difficult respiration, marked pain in the abdomen and back where large muscle groups are in spasm, incessant cough with expectoration, profuse lacrimation, burning pain at the site of contact with redness followed by urticaria, flushing of the skin, moderate dilatation of the pupils, and fear and anxiety. The symptoms persist for only a few hours even without treatment, but the patient is susceptible to muscle cramps for weeks when swimming or exercising, and a red discoloration at the site of contact may persist for months.

Stuart and Slagle report that a naval officer and a soldier on duty in Puerto Rico were stung by a Portuguese man-of-war on various parts of their bodies. The symptoms were those previously mentioned, particularly difficulty with respiration, muscle spasm with boardlike rigidity of the abdomen and lumbar muscles, severe burning pain in the area of contact, redness followed by urticaria, and anxiety and fear. The similarity of these symptoms to those in patients suffering from the bite of the black widow spider suggested that the same treatment was indicated. The senior author had recently pointed out in a memorandum that the treatment of choice in the latter condition was the intravenous injection of calcium gluconate. The naval officer and the soldier were given 10 cc. of 10 per cent calcium gluconate by vein, and in both cases there was prompt relief from muscle spasm and respiratory difficulty. The effect, in fact, was instantaneous and dramatic in the officer and the soldier expressed marked relief from dyspnea and pain even before the injection was completed; after the entire dose had been given, his respiration was free and regu-

lar, the abdomen soft, and the cramps in his extremities gone. The marks of the tentacles, however, were still plainly visible four weeks later on the naval officer, and two weeks later there was still a sharply defined line of depigmentation over the area of contact on the soldier.

Stinging jellyfish are widely distributed in temperate and tropical waters. These two severe cases serve to emphasize the danger of the sting of this animal, especially in tropical waters, and suggest the further trial of a method of treatment which gave prompt relief of the major symptoms.

PHYSIOTHERAPY CLINIC IN THE JUNGLE

A physiotherapy clinic was created out of makeshift materials by members of a hospital unit on the highway (Ledo Road) which Allied troops are building from Assam, India, through Burma to China. The chief of surgery in the unit saw the need for physiotherapy for patients with fractures, contusions, and injuries of muscles, bones, and joints, and as the hospital unit had no physiotherapy facilities, a medical officer and an Army nurse, neither of whom had experience in physiotherapy, were selected to devise the clinic. They took over some space in a bamboo basha and went to work to make equipment. An apparatus to provide dry heat was made from a crate with a socket for an electric light. A weight-lifting device for exercising arm and leg muscles was made from stirrups to which ropes and weights were attached. A Chinese officer contributed a bicycle for leg exercises. Old gasoline tanks were used for whirlpool foot and arm baths. A gasoline drum with a false bottom built a foot from the base was used to heat water; between the false bottom and the base an opening was made through which bamboo chips were set afire under the water. The rubber core of an old softball was used for hand and finger exercises.

The Chinese patients became interested in these devices and some gave the clinic articles which could be used for physiotherapy treatments.

EIGHT NURSES AWARDED THE PURPLE HEART

The War Department announced on 8 May that eight officers of the Army Nurse Corps have been awarded the Purple Heart for wounds received as a result of enemy action in Italy. They are Second Lieutenants Irene Virginia Barton, Anderson, South Carolina; Ruth D. Buckley, Elmwood, Wisconsin; Mary W. Harrison, Belpre, Ohio; Ruby L. Hoppe, Friedheim, Missouri; Helen A. McCullough, Wichita, Kansas; Frances Virginia Raymond, Wichita Falls, Texas; Ruth Catherine Sobeck, Cokesville, Pennsylvania; and Fern H. Wingerd, Omaha, Nebraska.

DEVICE FOR MAKING GAUZE DRESSINGS

Gauze dressings are cut at Letterman General Hospital by a powered knife from strips of gauze 18 inches wide and 4 yards long. Heretofore the large strips were rolled from a 100-yard bolt, fastening each end with special clips to the end of a table which was 4 yards in length. The personnel in the gauze room walked back and forth along the 4-yard table until four 100-yard bolts of gauze had been piled, one layer on the other, for 100 thicknesses. This bolt was then cut in mass production into 4 x 8, 4 x 4, and 2 x 2 dressings and anesthesia waste

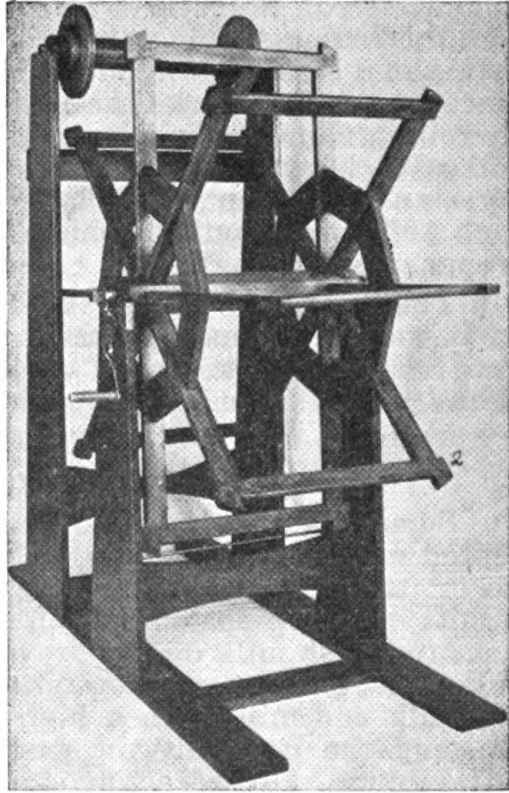


FIGURE 1

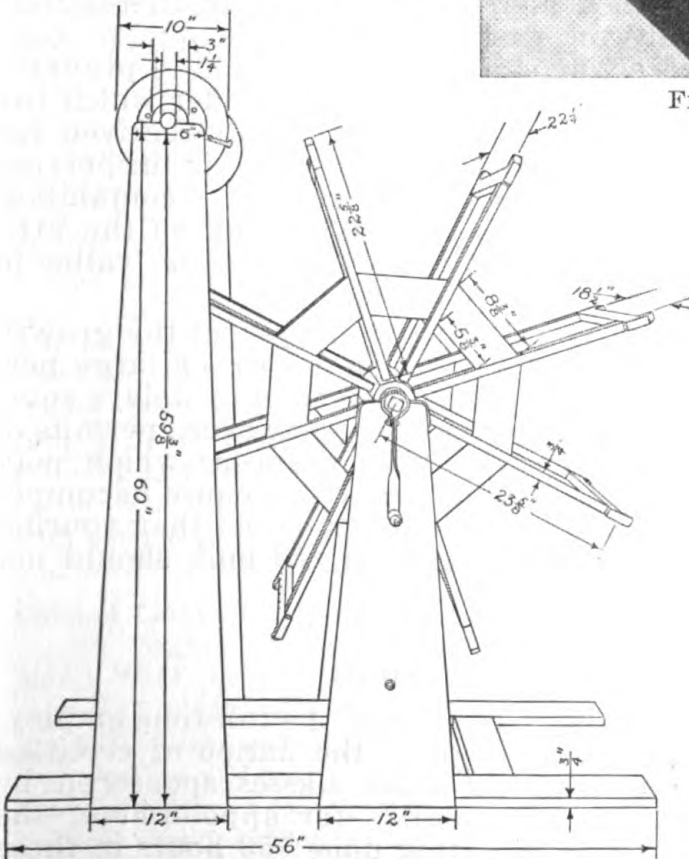


FIGURE 2

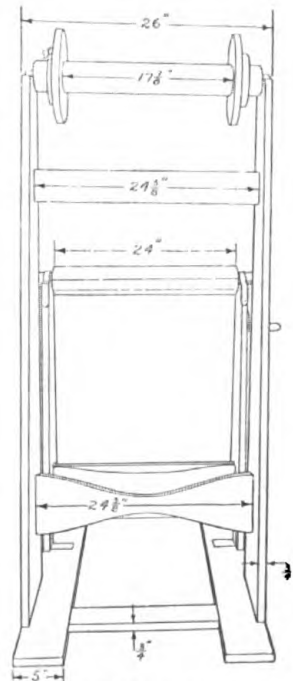


FIGURE 3

swathes. Much time and labor were lost in laying out the 100 thicknesses of gauze in 4-yard lengths on the table. To prevent this loss, a simple gauze roller has been constructed, consisting of (1) a spindle on which a 100-yard bolt of gauze is placed, and (2) a wheel the circumference of which is 4 yards. By rolling from the spindle onto the wheel, one 100-yard bolt makes 25 layers. The discrepancy in the length of the first layer and the twenty-fifth layer is about $\frac{3}{4}$ inch. By cutting each 100-yard length of gauze off the large wheel, this discrepancy is too small to be considered.

The construction of this machine is shown in figures 2 and 3. It was easily made in the post utilities shop. White pine wood was used; the finish, white shellac with waxed surface. It has proved to be a labor-saving device.

RE-PASTEURIZED MILK

Some plants supplying milk to Army stations have accepted milk for pasteurization that had been heat-treated to lower its bacteria count and prevent souring. This practice results in the re-pasteurization of milk. The Army specifications for fresh milk do not provide for the acceptance of such milk. To permit re-pasteurization would encourage the use of old milk and milk with a high bacterial content thereby increasing the possibility of gastric disturbances due to bacterial toxins. Few receiving stations are equipped to properly pasteurize milk. To determine the conditions under which the milk was pasteurized and the quality of the milk received for pasteurization would necessitate an increase in inspection work. Furthermore, pasteurized milk is subject to contamination and the phosphatase test, a valuable check on the efficacy of the pasteurization of milk, would be of no value in determining effective re-pasteurization.

Lactic acid bacteria in milk retard or prevent the growth of proteolytic organisms. Pasteurization destroys a large percentage of the acid-forming bacteria and thereby delays souring. The destruction of these bacteria, however, permits a more rapid growth of the proteolytic organisms which may be present in the milk. Proteolytic organisms cause decomposition of the milk which is a more serious defect than souring and not as readily detected. Re-pasteurized milk should not be accepted by Army installations.

ARMY NURSE'S AIDES

The Surgeon General has authorized the full-time employment in military hospitals throughout the nation of certified graduates of Volunteer Nurse's Aides classes sponsored by the American Red Cross. To qualify for appointment, the applicant must be certified as having done 150 hours in these classes and to have indefinite leave of absence from the Volun-

teer Nurse's Aide Corps of the American Red Cross. The aides will be able to perform a variety of duties in Army hospitals to help the nursing staff. Col. Florence A. Blanchfield, Superintendent of the Army Nurse Corps, said that by assigning a quota of these aides to an officer of the Army Nurse Corps competent care of our soldiers can be assured without draining too many of the personnel from private institutions. The establishment of the group will not eliminate volunteers on a part-time basis who are members of the American Red Cross Volunteer Nurse's Aide Corps.

The full-time employee will be placed on a U. S. Civil Service status and live in the quarters provided by the hospital at which she is stationed. The Army nurse's aide will receive \$75 a month, living expenses, and laundry. She will furnish her own uniform. Employing certified volunteers on a full-time basis will be left to the discretion of commanding officers of hospital installations.

AWARDS TO MEDICAL DEPARTMENT PERSONNEL

The War Department has recently announced the award of the Legion of Merit to the following Medical Department personnel. The citation follows the name of the person to whom the award was made:

Colonel Condon C. McCornack (now Brigadier General).

As surgeon of the Western Defense Command and Fourth Army from 12 November 1940 to 26 January 1943, his exceptional qualities of leadership, high professional knowledge, keen foresight, and sound judgment enabled him successfully to effect the organization and administration of the medical service of the command, thus assuring the availability of necessary medical supplies and the finest medical care for the troops, most of which were located in isolated combat positions on the west coast of the United States, immediately after the declaration of war on 8 December 1941. As Deputy Chief of Staff, Western Defense Command and Fourth Army, from 27 January to 14 September 1943, Colonel McCornack exhibited sound military judgment, tact, and resourcefulness in the coordination of headquarters, staff functions, and in the planning and handling of many details incident to the preparation of two major task forces which subsequently engaged and routed the enemy with complete success from one of his strongholds in the Aleutian Islands and forced his evacuation from the other.

Colonel Luther R. Moore, M.C., San Francisco, California.

As Surgeon for the Alaskan Department from December 1941 until March 1944, he established a highly efficient medical service for this command in spite of handicaps imposed by trying climatic conditions and the difficulties incident to hasty occupation of uninhabited islands during bad weather and with inadequate shelter. By his extensive professional knowledge, sound foresight, and effective planning, he provided adequate medical supplies through the command in spite of the wide dispersal of posts and limited transportation facilities.

Lieut. Colonel William A. Hutchinson, M.C., New Orleans, Louisiana.

For exceptionally meritorious conduct in the performance of outstanding service as Surgeon for the Eritrea Service Command from May 1942 to February 1943. The difficult and varied terrain in the area covered by this command created a diversity of climatic conditions which caused unusual health problems. Colonel Hutchinson established a highly efficient medical service for both military and civilian personnel, enforcing a rigid health control which was of great importance to the success of local operations. His systematic sanitation of all water supply points was an outstanding accomplishment. By his exceptional professional skill, untiring efforts, and effective methods of operation, Colonel Hutchinson contributed in a marked degree to the successful operation of the United States Army forces in Eritrea. Colonel Hutchinson was reported killed in an airplane crash on 23 February 1943.

Maurice S. Peterman, Technician Fifth Grade, Milwaukee, Wisconsin.

Exceptionally meritorious conduct in the performance of outstanding services in New Guinea from 28 October to 18 November 1943. Technician Peterman served as medical aid man for an overland caravan of heavy engineer equipment on a 70-mile journey in an advanced area. The trip was to have taken ten days but rains bogged down the tractors, scrapers, and trucks, and twenty-two days were required. Of sixty men in the caravan, one-half were at times incapacitated by illness or injuries incurred in endeavoring to move the heavy equipment across the swollen rivers. Throughout this time, Technician Peterman cared for the sick and injured, often toiling through the mud at night to reach all elements of the convoy and nurse the sick. He maintained accurate medical histories of all cases, which he turned over to the proper authorities when the caravan reached its destination. Thanks to his loyalty and devotion to duty, the group arrived with but two men ill. Technician Peterman performed an outstanding service on this arduous march.



Silhouetted against the Italian dusk, U. S. medical soldiers with medical supplies set out for the front. 15 January 1944. Signal Corps photograph.

RECENT DIRECTIVES AND PUBLICATIONS OTHER THAN S.G.O.

This list is intended as only a brief reference to the items mentioned. Before acting on any of them, the original communication should be read and request for copies, when made, should be directed to the source of the communication through proper channels.

- WD Technical Manual**
TM 8-285, 15 Apr. 44. •
Treatment of Casualties from Chemical Agents.—Recently revised. Supersedes TM 8-285 dated 27 November 1942. Contains many new methods of treating gas casualties. Recommend that every medical officer study this latest edition.
- WD Circular 109**
16 Mar. 44
sect. IV
Per Diem.—When temporary duty at a place other than old or new permanent station is directed in permanent change of station order, the order may prescribe per diem, and per diem will be paid for all travel and temporary duty performed under the order in accordance with rules prescribed in par. 3, W.D. Cir. No. 60, 1944.
- WD Technical Bulletin**
TB Med 28
1 Apr. 44
Makes provisions re "Treatment programs for psychiatric patients in station and general hospitals."
- AR 605-115**
C-7
5 Apr. 44
Leaves of Absence.—W. D. policy is that officers be returned under rotation directives (W.D. Cir. No. 58, 1944) rather than for leave of absence and return to oversea commands. Return of officers to be limited to emergencies, except when conditions in an oversea command justify and transportation facilities permit. Establishes policies in cases where exceptions to above policy are authorized.
- WD Circular 140**
11 Apr. 44
Makes provisions re hospitalization and evacuation of personnel in the zone of the interior. Sets forth general policies and instructions re responsibilities of various commanders, types and functions of hospitals, bed capacity, transfer and transporting patients, medical regulating services, hospital funds, medical statistical reports, and personnel strength tables.
- WD Memo W40-44**
12 Apr. 44
Central Service System.—To be established in station hospitals of 750 beds or larger. C. O.'s of such hospitals where Central Service System not in existence to prepare and forward to S. G. a plan for establishment of such system in accordance with principles set out. Makes provisions re physical layout of system and administration principles to be followed when system is in operation. Sets forth list of equipment and supplies to be used.
- WD Circular 147**
14 Apr. 44
X-ray Films.—Sets forth detailed instructions re disposition of exposed x-ray films in Army medical installations, including hospitals, dispensaries, and induction stations.
- WD Circular 150**
15 Apr. 44
sect. VI
Sets forth policy re accepting selectees with either inguinal or femoral hernia.
- WD Circular 162**
25 Apr. 44
sect. VIII
Venereal Disease.—Effective 1 May 1944, men inducted into service whose assignment to duty is deferred during hospitalization or treatment for venereal disease incurred prior to induction are not subject to provisions of AR 35-1440 and are entitled to pay and allowances from date of induction.

WD Circular 161
25 Apr. 44

Officer Battle Casualties.—Makes provisions re assigning certain officer patients who are not required by the hospital for use in reconditioning program and who will require three months' additional treatment before final disposition to staff or headquarters duties on detached service if such officers so desire. Sets forth procedure to be employed in accomplishing such temporary assignments.

WD Circular 164
26 Apr. 44

Establishes general principles to govern use of military manpower based on physical capacity of individual and prescribes specific physical defects which disqualify an individual for oversea service. All commanders directed to require officers under their jurisdiction to read this circular within forty-eight hours after its receipt.

WD Circular 165
27 Apr. 44
sect. II.

American Red Cross—Medical Records.—When member of American Red Cross is discharged from Army hospital, all clinical records and medical data will be forwarded to Medical Director, American National Red Cross, Washington, D. C.

General Accounting
Office Daily Synopsis
of Decisions
27-29 April 1944
(B-41449)

Retired Army officers' employment by Government corporation (RFC) constitutes holding "office" within the meaning of sect. 2 of Act of 31 July 1894, which prohibits persons whose annual compensation in one office amounts to \$2,500 from holding another office to which compensation is attached. Retired Army officer may be appointed only if he relinquishes retired pay during such employment.

ASF, Headquarters
Circular No. 123
2 May 44
Part I, sect. I

Safety Program.—Rescinds S.O.S. Cir. No. 55, 1942. Sets forth responsibilities of C.O.'s of W.D. installations and of chiefs of technical services. S.G. responsible for: (1) assisting in determining doctrine and preparation of texts and manuals for safety training; (2) maintaining statistical data with reference to causes of injuries; (3) submitting to PMG statistical summary of injuries; (4) coordinating program for control of occupational diseases with the Safety Program. C.O.'s of Class IV installations to inform appropriate chief of technical services by 1 June 1944 of the name of safety director in their installations.

WD Circular 172
2 May 1944
sect. II

Former officers of any component of A.U.S. who were honorably discharged from commissions because of physical disqualification only, subsequent to 31 August 1940, and are inducted into Army, will be appointed to A.U.S. in grade formerly held and assigned in arm or service in which formerly assigned. Makes similar provisions re R.O.T.C. graduates.

ASF, Headquarters
Circular No. 123
2 May 1944
Part III, sect. VII

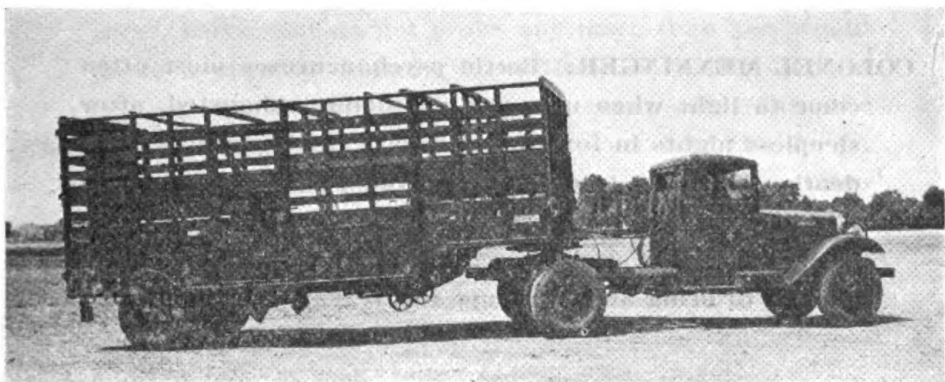
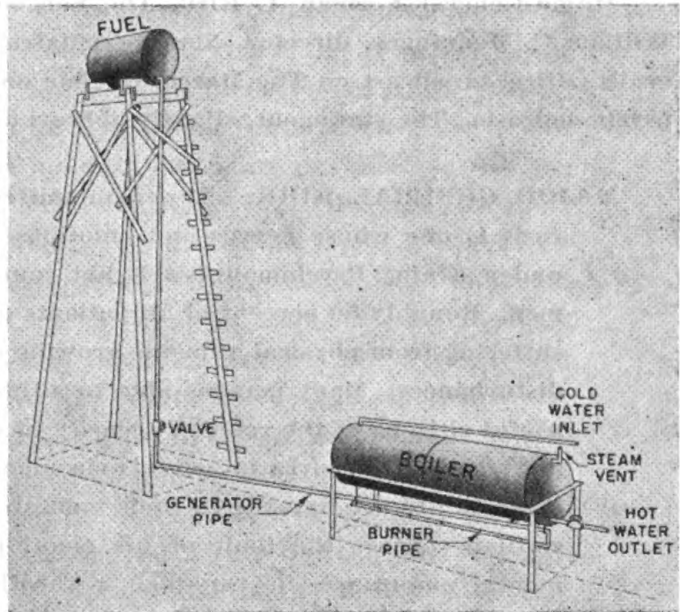
All A.S.T.P. contracts, except medical, dental, and veterinary, permitted to expire on 30 June 1944. When training is to be continued into fiscal year 1944-45, a new training contract will be executed.

AR 600-45
3 May 1944

Purple Heart.—Permits award to personnel severely frostbitten while engaged in combat. Only one award to be made for two or more injuries or wounds received from one missile, force, explosion, or agent. Wounded soldiers' unsupported statements may be accepted in unusual circumstances when no corroborative evidence obtainable.

IMPROVISED WATER HEATER

A service squadron in the Southwest Pacific Area devised a water heater for use with its washing machine. On account of much rain, dry firewood could not be found. The high gravity feed illustrated was necessary to provide a smokeless flame against the underside of the generator pipe and boiler. Five holes, each $\frac{1}{32}$ inch in diameter and equally spaced, are drilled in the top of the burner pipe to serve as jets for the escape of the fuel vapor. The feed or inlet end of the generator pipe must be lower than the burner to prevent vaporized fuel from going back into the feed line instead of forward to the burner. A shield made of tin roofing is attached vertically and parallel to the burner and generator pipes, on each side, to keep the wind from blowing out the fire. These shields are not shown in the diagram. Because of the shortage of pipe fittings, all joints of metal to metal were welded. The fuel tank is refilled by a hand-driven aeroplane refueling pump. Staff Sgt. Arthur S. Saily constructed the blowtorch-type fuel burner. This model consumes about 2 gallons of crude oil, kerosene, or gasoline per hour and will heat 100 gallons of water to boiling in 20 to 30 minutes. This information was furnished, on request, by First Lieut. William H. Potter, M. C., squadron surgeon.



U. S. Army horse ambulance. Signal Corps photograph.

**BROADCAST ON PSYCHONEUROSIS
ON MARCH OF TIME**

Major General Norman T. Kirk, The Surgeon General, and Colonel William C. Menninger, director, Neuropsychiatric Division, Surgeon General's Office, broadcast on The March of Time on 11 May a statement on psychoneurosis. The statement, slightly abbreviated, follows:

MAJOR GENERAL KIRK: A person suffering psychoneurosis is one whose nerves and emotions have given way under strain. Psychoneurosis is not confined to fighting men. Roughly 50 percent of all patients of all doctors are suffering from physical ailments growing out of emotional disturbances. Many persons able to adjust themselves as useful citizens in the relative security of civilian life cannot adjust themselves to army environment. The stresses of army life are hazards to their mental health. When a civilian reaches the limit of his emotional, nervous, or mental endurance, he can take a vacation. But in the army a man either stays on duty or goes to the hospital. Many soldiers who develop psychoneurotic symptoms during their training period probably had similar symptoms in civilian life. But of those who break under combat conditions, the majority never displayed psychoneurotic traits before. They break only under extraordinary strain, and some of them must ultimately be discharged from military service. It is up to every civilian man and woman to help them readjust themselves by treating them as normal, sane individuals, which they are. They are not fakers or cowards. They are men with invisible wounds.

COLONEL MENNINGER: Battle psychoneuroses most often come to light when men are completely exhausted, after sleepless nights in foxholes and days in constant peril of death. The first treatment is given at clearing stations within sight and sound of the front, where hot food, a bath if possible, sedatives, and a long sleep often are enough to bring about prompt recovery. Other men must

be sent to evacuation hospitals where much the same treatment is repeated, but for a longer time. Forty percent are salvaged by these methods and promptly returned to combat duty. An additional 40 percent are recovered by still further treatment. The remaining 20 percent must be returned to this country for extended care. Today, many soldiers who a year ago would have been discharged as unfit for duty are being retrained to fill specific army jobs. Every individual has a different breaking point. I recall a sergeant in the tank corps in the bitter North African campaign. Twelve tanks were shot out from under him, and in four instances he was the only surviving member of the tank crews. Only after all that did his nerves give way and he had to be hospitalized. He responded to rest and quiet, however, and showed he still had courage by going back to the lines as an infantryman. On the other hand, there was a boy of eighteen who was crowded into the Army from a very intimate and attached family atmosphere. He became homesick, depressed, and was subject to upset stomach. He was sent to the dispensary and a checkup revealed nothing organically wrong. Each training camp has a psychiatric clinic and this boy was sent there for consultation. He was helped to realize that his stomach-aches were only an automatic expression of his emotional upset and that he had a job to do along with millions of other men who were also anxious to return home.

When you meet psychoneurotics who have been discharged from service, do not give them undue attention or prying interest. If they want to talk about their experiences, listen, but do not probe any more than you would probe a physical wound. Treat them as normal human beings. There is no reason to deny them jobs. They are just as competent as before they went into the Army, perhaps more so. Modern warfare is tough, and the man who returns from the fighting with a wound of his nerves or emotions deserves the same consideration as the man who wears a physical wound beneath his shirt.

Correspondence

DENTISTRY IN THE CHINESE ARMY

The following letter from the theater dental surgeon, U. S. Army Forces, China-Burma-India, was addressed to the director of the Dental Division in The Surgeon General's Office.

The Medical Department of the Chinese Army consists of a Pharmacy Corps and their T/O calls for about one Pharmacy Corps officer for each 700 men. All Pharmacy Corps officers are trained to serve as emergency dentists as well as pharmacists. The U. S. Army Dental Corps has been of great assistance to the Chinese Army in training some Pharmacy Corps officers in certain phases of dentistry.

There are now two sections in the theater in which training is afforded and one additional center is contemplated. A unit of the Chinese Army is selected for a dental survey, for the correction of emergency dental problems, and for the training of the Pharmacy Corps officers in that unit. A regiment, for example, consisting of about



Examining a Chinese soldier's teeth during a survey. The officer with the paper is recording the dental classification.



U. S. Army dental officer teaching a Chinese Pharmacy Corps officer the technique used in removal of teeth.

1,300 men will generally have two such officers. A time is selected, convenient to the organization, when they can be called together and surveyed. The following day those emergency cases selected for treatment will be called to the regimental dispensary. Only one-half day at a time is permitted for such work, since other training is in progress. An American dental officer accompanies the two Pharmacy Corps officers of the organization, and about three hours are devoted to the demonstration of the removal of infected teeth as well as the teaching of other subjects. Chinese officers, previously trained, assist in the training when available, since difficulty is experienced with the language. About 15 percent of the regiment will be classified as requiring

emergency dental treatment and about two weeks are necessary to com-

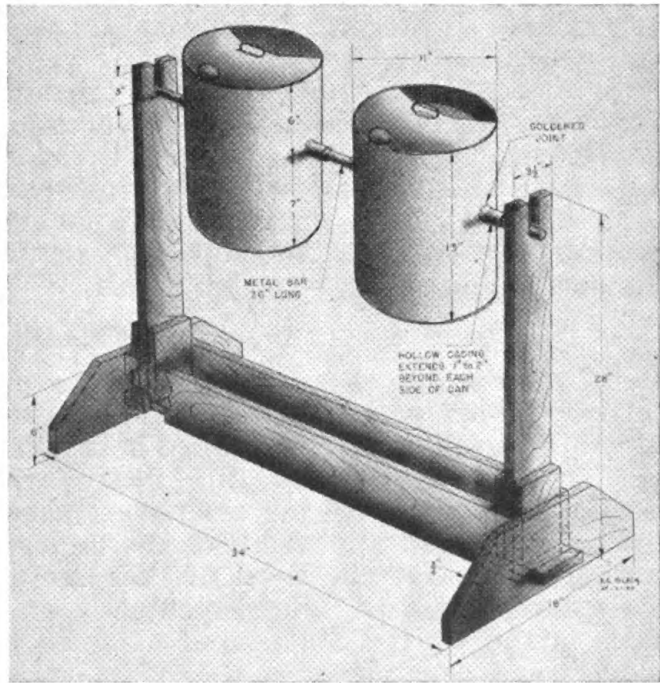
plete this group. Comparatively few Chinese soldiers have experienced dental treatment. The present schedule of training for these Chinese Pharmacy Corps officers consists of eight weeks' (five days a week and three hours a day) study and work with a total of about 120 hours of instruction. Some of the training was also conducted at the post hospital dental clinic.

The following subjects are now presented in this very limited schedule: sterilization of instruments; scaling of teeth and treatment of gums in acute and chronic gingivitis; anesthesia, local, with Luer-Lok syringe; extraction of teeth and retained roots; types of patients to send to the hospital.

The Chinese soldiers must, according to their philosophy, accept dental treatment with a smile or suffer disgrace from their own people. If a Chinese soldier is taken away from his group into an office to have dental work done, the remainder of the group become apprehensive.

A HAND-WASHING DEVICE

Captain Maurice B. Johnston, M. C., writes that the arrangement illustrated here has been found efficient as a hand-washing device. It can be made along similar lines in any size. These are five-gallon oil cans with about one-third of the top removed but with the spout intact. An opening is drilled through both sides of the cans 6 inches from the top and a hollow metal casing is inserted into each hole. These hollow casings protrude 2 inches on each side of the can and are secured and the joint made watertight by soldering. The spout is perforated with nail holes to provide a spray.



A solid metal bar or pipe 36 inches long is fitted through the hollow casings. The ends of the bar or pipe are fitted into a notched upright which consists of a piece of $\frac{3}{4}$ - or $\frac{7}{8}$ -inch lumber cut to size and fitted into the base. The upright is notched 3 inches deep and wide enough to admit the supporting bar or pipe. The base holds the uprights in place and supports the entire assembly. The bottom is one long board which extends beyond the sides. The two ends fit over the extended bottom and against the ends of the sides. Four short boards are nailed into the base to form two sockets for the uprights.

To use this device, one man is stationed behind the cans to lift them alternately from the bottom, thus tipping the top forward and causing a spray. The first can is filled with a soap and water solution and the second with clear water. As each soldier in line approaches, his hands are sprayed with the soap and water solution; then after rubbing them thoroughly, he rinses them with a spray from the clear-water can.

Special Articles

Current Trends in Military Neuropsychiatry

An important lesson learned in World War I was that some men physically qualified for service were noneffective as soldiers because of mental abnormalities. Untrainable, untreatable, morale-disturbing, and eventually expensive liabilities, these were the psychotics, mental defectives, severe psychoneurotics, and psychopaths. As a result of this lesson there developed in military neuropsychiatry "the era of diagnosis and disposal" during which it was believed that normal men did not develop psychiatric disorders. It followed that if a man developed a psychiatric disorder, he must have been abnormal originally. Many authorities came to believe that the entire problem of psychiatry in the Army could be solved by careful screening at induction and by constant search and elimination of these individuals during the training period. A lesson learned early in the present war was that this problem is by far not so simple. Psychiatric screening, although important, was only the first step.

About 12 percent of the men examined at induction stations were rejected as mentally or emotionally unfit for service. Despite the screening process, the rate at which men were appearing at sick call with neuropsychiatric disorders was high; not only have many cases appeared among troops in training, but the leading cause for casualties returned from overseas has been neuropsychiatric.

NATURE OF THE CASES

The screening process has not been useless, as mental defectives, severe psychopaths, psychoneurotics, and psychotics cannot be used in the Army. These groups, however, comprise a small fraction of the neuropsychiatric cases being encountered. The vast majority were cases of psychoneurosis, which constituted almost all of the neuropsychiatric cases occurring in combat and most of those returned from overseas. The greater part of neuropsychiatric cases admitted to hospitals in the United States and of those discharged from the Army were psychoneuroses. Evidence accumulated indicating that a large proportion of these cases were occurring in persons whose past history was negative for neuropathic traits. In another significant number there was a history of psychologic disturbance, but the examining psychiatrist felt that the stress of the situation rather than the weakness of

Condensation of a paper prepared in the Neuropsychiatry Division of The Surgeon General's Office and presented by Lieut. Colonel Malcolm J. Farrell, M. C., and Captain John W. Appel, M. C., before the Annual Meeting of the American Psychiatric Association, Philadelphia, 16 May 1944.

personality was more important in causing the disorder. The myth that only weaklings develop psychiatric disturbances was finally completely exploded by reports from a combat theater where a very careful study was made of this problem. In one campaign the psychiatric cases were uniformly more numerous among veteran combat troops than among fresh, green troops. Intensive combat had weeded out all weaklings from these troops. It became evident therefore that anybody could develop a psychoneurosis under certain conditions. Thus the limitations of screening became obvious.

LIMITATIONS OF SCREENING

Psychiatric screening can weed out abnormal men but cannot have any effect in decreasing the rate at which "normal" men break down. Furthermore, screening may eliminate men who, if properly handled, can be valuable to the Army. Extensive studies are being made of troops successful in training and of troops with intensive combat experience who have not developed psychiatric disorders. While the incidence of neuropathic traits, for instance, is higher among men who have broken down than among those who have not, the preliminary results of these studies show that many men successfully make the grade who admit having signs and symptoms ordinarily taken

to indicate weakness of personality structure. For instance, among all troops on duty in the United States, a significant percentage admit nail biting, say they have sick headaches, nightmares, "upset stomachs," nervousness, insomnia, dizzy spells, and frequent palpitation. It is probable that these signs and symptoms are more common among "normal" civilians. This means that screening must reject obvious psychiatric noneffectives but must not attempt to detect potential psychiatric casualties.

Out of the erroneous assumption that anybody who develops a psychiatric disorder was a weakling came the policy of discharging all those labeled with a psychiatric diagnosis. The waste of manpower inherent in this policy was demonstrated when 60 to 80 percent of the cases occurring in combat recovered and returned successfully to full combat duty, provided they had been regarded as medical emergencies and had been properly treated. Another unfavorable result of this

COMPARATIVE NEUROPSYCHIATRIC ADMISSION RATES

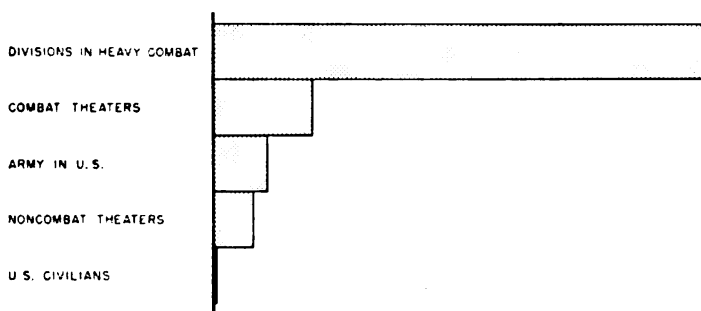


FIG. 1

policy became evident. Studies revealed that, although true malingering was very rare, the escape mechanism was prominent and frequently close to the conscious level. The policy of discharging these cases not only made the escape mechanism effective but encouraged its use. To circumvent the escape mechanism and remove the gain from illness, it might be necessary to retain psychiatric noneffectives in the Army instead of discharging them. This is a people's war and must be fought by the people regardless of the stability of their personality structure.

Thus it became clear that psychiatrists would have to do more than concern themselves with diagnosis and disposal. Instead of discharging cases it would be necessary to salvage them. It had to be recognized that screening processes could not be called prevention. It was necessary to find what caused men to break down. The problem involved not only psychotics and psychopaths but also the everyday problems of everyday soldiers.

DYNAMIC FACTORS

Figure 1 shows that by all odds the highest admission rates occur in troops in actual combat. The highest rates of all occur in the smaller units where the highest concentrations

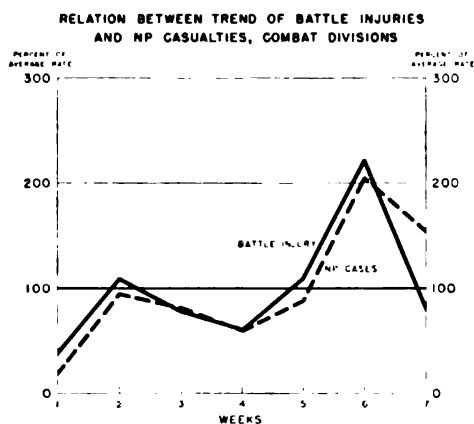


FIG. 2

of men actually exposed to fighting conditions exist. In overseas theaters where there is no active combat, the rates are lower than among troops in the United States, in spite of the fact that extremes of temperature, boredom, and isolation may be present. Important to an understanding of the military psychiatric problem is the rate of admission of civilians to mental hospitals. While this cannot be compared to the Army admission rate, its relative magnitude shows how the psychiatric problem in the Army differs from that in civil life. The vast majority of neuropsychiatric cases admitted to Army hospitals would not be even considered for hospitalization in civil life. Cases of psychoneurosis, psychopathic personality, mental deficiency, and inconspicuous psychosis can get along in civil life without hospitalization. In the Army a very mild disturbance may cause a man to drop out of the ranks and, if he is unfit for duty, there is no place for him except the hospital. Admission to a civilian mental hospital occurs only when the condition of an individual has changed, a new disorder has developed, or an existing disease becomes worse. A large proportion of psychiatric cases admitted to Army hospitals are no more sick than before they came into

the Army. It has merely become evident that they cannot do the required duty. The difference becomes more evident when it is recalled that Army psychiatric cases arise in a population from which the least stable segment has been screened out—the same segment from which the majority of cases are admitted to hospitals in civil life.

That the highest neuropsychiatric admission rates occur in combat is not surprising. It is the degree of difference between rates in combat and rates elsewhere which is not sufficiently recognized. In figure 2 the rates for battle injuries and neuropsychiatric casualties among certain divisions were compared during a seven-week period of combat. The rates have been expressed as index numbers having as a base the average rate for the period in each case. The rate of battle injuries is presumed to be an index of intensity of combat which is thus shown to have a remarkably direct relation with the rate of neuropsychiatric casualties. Figure 3 shows the percent of combat casualties which were neuropsychiatric

NEUROPSYCHIATRIC CASUALTIES AS
PERCENT OF COMBAT CASUALTIES

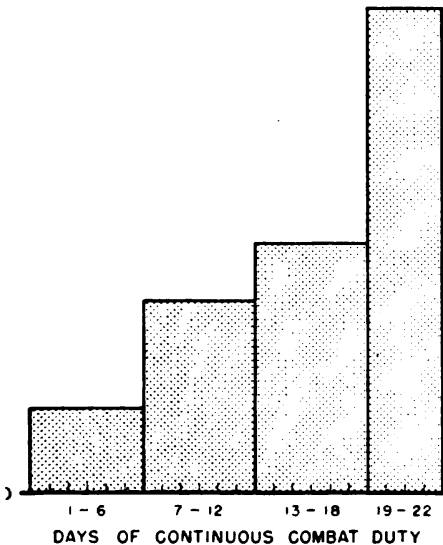


FIG. 3

among certain battalions serving continuously in the line without relief for twenty-one days. The percent of neuropsychiatric casualties rises in direct proportion to the length of active combat duty. Difficulty in sleeping under shell fire in foxholes, extremes of temperature, wet, and mud, cold food, and constant demands for physical exertion produce physical and mental fatigue which precipitates these psychiatric breaks; and rest induced by sedation appears to be the most important factor in their recovery. There are other factors. Some cases appear to be casualties of job misassignment: timid clerks assigned to machine gun teams, truck drivers assigned as clerks. The morale of a unit bears a direct relation to the number of neuropsychiatric casualties; in fact, beyond a certain point, low morale actually constitutes a psychiatric disorder. From the experience of this war there has emerged increasing evidence that attitudes toward the enemy play a major role in the development of psychiatric disorders and in morale and operational efficiency. Everything else being equal, a man who has personal conviction as to the necessity for fighting is less likely to develop a psychiatric disorder than a man indifferent to the broader issues and more concerned with his purely local situation.

SOLUTION OF THE PROBLEM

Obviously a number of factors were important in causing psychiatric disorders—personality structure, fatigue, leadership, morale, discipline, job assignment, motivation, training, domestic difficulties. If psychiatric cases were to be prevented, it would be necessary to control or modify all of these factors. Several major steps have been taken. The first was to place psychiatrists at the command headquarters of each basic training center, where they engaged in the triple function of screening, prevention, and treatment. Young psychiatrists were taken out of the hospitals and assigned to field units in order to provide care as close to the front line as possible.

Preventive measures have been taken along (1) educational, (2) motivational, and (3) environmental lines. By education is meant the attempt to teach military personnel what has been learned about human nature from the study of mental disease. This knowledge can be used by individuals for the maintenance of their own health and by officers in the problems of leadership and morale.

Six lectures on mental health are given to all officers in the Army. These cover the principles of personal adjustment, personality structure, motivation, specific stress factors, signs and symptoms of breakdowns, and measures to maintain mental health of the group. Three lectures are given to all enlisted men covering personal adjustment problems, fear, resentment, the bodily effect of emotions, and a healthy viewpoint toward being in the service. The most effective means of disseminating psychiatric knowledge has been found to be informal discussions with line officers either singly or in groups. Informational media are beginning to be used. Articles on mental hygiene, fear, adjustment problems, and the causes of nervous breakdowns have appeared in camp newspapers, War Department pamphlets, and Army periodicals. To attack the problem of motivation of military personnel early in the war, the Army set up the Morale Services Division to assist in supplying troops with current news and information concerning the causes of the war. One hour each week is set aside for all troops in training to discuss news and problems of why we fight, under the leadership of the unit commander. Each regiment has an orientation officer who advises the commander and supplies these groups with informational material sent him from Washington. Psychiatrists at replacement training centers and in divisions are beginning to act as advisers to the orientation officers and unit commanders. There has been increasing collaboration between The Surgeon General and the Morale Services Division in these activities.

The majority of the factors which determine the mental health of military personnel are functions of command. The psychiatrist acts as adviser to the command. He surveys the

training program from a psychiatric viewpoint, advises concerning training schedules, methods of conditioning troops to battle situations, and adjustment to extremes in climate. Collaborating with the personnel classification officer, he seeks to prevent psychiatric disorders by bringing a medical viewpoint to bear in job-assignment problems. He quickly detects signs that troops are overworked. He assists other agencies important to the mental health of troops: the chaplain, the Red Cross, the recreation officer.

TREATMENT

The present policy is to regard every case as salvageable until proved otherwise. Priority must be given cases expected to return to duty. However, it is intended to make every effort possible to initiate treatment of personnel awaiting discharge to civilian or veteran facilities.

A second policy is that every case shall be regarded as a medical emergency. It is vital to start treatment immediately while the cases are still in an amorphous state in order to prevent symptoms from becoming fixed. A third principle is to attempt to keep psychiatric patients out of hospitals which have the effect of exaggerating the concept of illness in the patient's mind. To an increasing degree, patients are being treated on an outpatient basis. The clinics are maintained by the division and replacement training center psychiatrists. To investigate the possibilities in this direction, separate battalions for retraining psychoneurotics were set up in three basic training centers. These battalions are not distinguished from the troops as a whole and follow similar military programs, except that emphasis is given to training in specific skills rather than to marches and obstacle courses. The success of these centers warrants their continuation and extension. The fourth treatment principle arises from recognizing that many psychiatric cases are situational reactions. Every effort is made to modify and remove the situational factor which is believed to have precipitated the disorder. This applies particularly to the problem of job assignment. In hospitals, insulin and electro-shock are proving of value for the treatment of psychoses. Group psychotherapy is being adopted rapidly and increasing use is made of occupational therapy, recreation, athletics, and music. All general hospitals in this country have a program of graduated convalescence in which full use is made of military discipline, technical and vocational training, education, recreation, and entertainment. Neuropsychiatric patients participate in this program as a separate group. Special hospitals have been set aside for the treatment of neuroses in several overseas theaters. In this country there are two hospitals exclusively for mental patients and, in addition, sixteen general hospitals have been designated as neuropsychiatric centers.

CONCLUSION

Many difficulties remain. Perhaps the most outstanding is the widespread misconception regarding mental health in the minds not only of military personnel but also of the civilian public, the family back home, and the public press.

The problems of mental health in this war have presented a major challenge to psychiatrists. To meet this challenge, it was necessary to revise concepts and to approach problems with new viewpoints. It was necessary to shift attention from problems of the abnormal mind in normal times to problems of the normal mind in abnormal times.

Clinical Significance of the Rh Factor

The development of methods for demonstrating blood groups and for classifying and cross matching blood has made transfusion a relatively safe procedure. However, occasional hemolytic reactions continue to occur. The cause of these reactions was not known until 1940 when Landsteiner and Wiener demonstrated that incompatibility within the same group could occur when A,B,O group compatibility is proved. By injecting rabbits or guinea pigs with red blood cells from the *Macacus rhesus* monkey, they produced a serum which would agglutinate 100 percent of rhesus monkey cells, and with this serum they demonstrated the Rh agglutinin, so named because it was first found in the rhesus monkey. About 87 percent of human beings, regardless of their A,B,O blood groups, contain Rh agglutinin in their red cells, and those who do not occasionally become immunized following transfusion with Rh positive blood. The importance of this finding lies in the fact that 13 percent of white people and 5 percent of Negroes whose red cells do not contain Rh agglutinin may become immunized when the agglutinin is introduced into the blood stream.

In 1940 Levine showed that an Rh negative woman who becomes pregnant with a fetus whose blood cells are Rh positive will probably become immunized against the Rh positive red cells. It was also shown that when Rh negative recipients receive multiple transfusions of A,B,O group compatible blood which is Rh positive, hemolytic reactions of increasing severity may occur. This finding is of tremendous importance in the Army where multiple transfusions may be indicated following injuries and chronic sepsis. The chief significance of the formation of anti-Rh agglutinins by an Rh negative individual is that subsequent transfusions of Rh positive blood may lead to fatal hemolytic reactions.

From the Surgery Division of The Surgeon General's Office.

The Rh agglutinin is inherited as a Mendelian dominant in about 87 percent of white people, 95 percent of Negroes, and 100 percent of Chinese. The 13 percent of white people and the 5 percent of Negroes who do not have Rh agglutinin in their red cells are designated Rh negative. It is this group of recipients who may be isoimmunized during pregnancy or following multiple transfusions of Rh positive blood, and from a military standpoint the latter group must be protected against such immunization. Rh positive persons, except in exceedingly rare instances, will not be immunized by multiple transfusions and thus no concern need be felt regarding Rh incompatibility.

As Rh antibody has never been found in man before isoimmunization, hemolytic intragroup reactions should not be expected to follow the first transfusion of Rh positive blood into a nonimmunized Rh negative recipient. Reactions resulting from Rh incompatibility should not be expected when multiple transfusions are given to nonpregnant individuals in close sequence, but may occur if a few days or few weeks intervene between transfusions. However, the first transfusion of Rh positive blood into an isoimmunized pregnant woman may cause a serious or fatal hemolytic reaction.

Levine reported that a majority of erythroblastotic babies are Rh positive whereas the mothers are Rh negative, and that erythroblastosis fetalis had not been demonstrated when both the mother and the infant are Rh positive. He demonstrated a specific agglutinin for Rh positive cells in many Rh negative mothers with erythroblastotic babies, and explained the isoimmunization by postulating that Rh positive fetal cells cross the placental barrier, entering the maternal circulation where, acting as an antigen, specific antibody is formed. Levine also pointed out that the agglutinin is present in such small amounts in many such cases that it cannot be demonstrated by laboratory tests, and that hemolytic reactions occur in such recipients following transfusion of Rh positive blood when the Rh antibody cannot be demonstrated in the plasma of the recipient. As a result of the isoimmunization, Rh negative recipients, especially Rh negative pregnant women and erythroblastotic babies, should receive only Rh negative blood. In the case of pregnant women, erythroblastotic babies, and in Rh negative recipients who have received multiple transfusions, antibodies may already be present which may give rise to severe or fatal hemolytic reactions if Rh positive blood is transfused.

Tests for Rh Agglutinogens and Agglutinins

Animal antiserums have been found unsatisfactory for determining the presence or absence of the Rh agglutinin, and it is necessary to depend on isoimmunized human donors for Rh

grouping serum. As only a few immunized donors produce satisfactory active Rh grouping serum, the supply is limited.

The Rh agglutinin acts best at incubator temperature and weakly or not at all at lower temperatures. The test for Rh agglutinin is simple and accurate, provided the grouping serum is potent. The antibody deteriorates rapidly at high temperature, more slowly at refrigerator temperature, and little or not at all in the frozen state. Preservatives cause a rapid decrease in potency and their use is not advocated. An effective way to preserve Rh antiserum is to put sufficient serum for a single test in separate test tubes which are then placed in the freezing chamber or evaporator of a mechanical refrigerator. The serum should preferably be stored at -5° to -10° F. The small amount of serum in each tube can be quickly thawed for use by placing it at room temperature.

The increase in multiple transfusions at Army installations will require an increased number of Rh negative donors, and to have a sufficient number available an Rh negative donor list should be maintained at all times. Proved group "O" Rh negative donors may safely be used in emergencies without further grouping or cross matching. This group of donors should be reserved for emergencies which do not permit time for the usual cross matching. Anti-Rh grouping serum may be obtained in limited quantities from the Army Medical School by requisition.

Technique for Rh grouping

The technique for Rh grouping employed by the Division of Surgical Physiology of the Army Medical School is outlined below.

1. Small narrow test tubes, inside diameter 7 to 8 mm., are used. Small Kahn tubes are satisfactory.
2. Place one drop of the Rh antiserum in the test tube and add one drop of a fresh 2 percent blood suspension in saline.
3. Shake and place the tube in an air incubator or water bath at 37° C. for one hour.
4. After incubation read the reaction by very gently resuspending the sedimented cells and inspecting for macroscopic agglutination.
5. If macroscopic agglutination is not noted, centrifuge the tubes at 750 to 1,000 r.p.m. for one minute; then resuspend the packed cells by gentle shaking and observe for macroscopic agglutination.
6. If macroscopic agglutination is not visible, examine microscopically on slide.
7. Absence of agglutination designates the blood Rh negative, and any degree of agglutination, Rh positive.
8. Controls should be set up when possible.

Clinical Uses of Products Made from Human Fibrinogen and Thrombin

LIEUTENANT EDGAR A. BERING, JR.
Medical Corps, United States Naval Reserve

Large scale fractionation of human plasma to obtain normal serum albumin by methods developed at the Harvard Medical School¹ has made available for clinical use many other blood proteins. Among these the proteins concerned with the clotting mechanism, fibrinogen in its natural state, prothrombin converted into thrombin, and both combined in fibrin products, have been used. The wide range of possible clinical applications possessed by these materials is based on the ability of thrombin to clot fibrinogen, the adhesive quality of clotting fibrinogen, and the minimal tissue reaction excited by fibrin. Prothrombin converted into thrombin has always been used because only in this state does it act as a clotting agent. While fibrinogen has been used in its natural state,^{2,3} its greatest uses have been as fibrin film and fibrin foam. These have been used largely in neurosurgery, the film as a dural substitute and the foam in conjunction with thrombin solution as a hemostatic agent. As fibrin foam and fibrin film are made entirely from human protein, they possess any advantage which may be derived from the use of materials of homologous origin. Experience is yet inadequate to ascertain of how much practical importance this may prove to be.^{4,5} However, the use of human thrombin eliminates all fear of the sensitivity phenomenon observed with thrombin of animal origin.

This work has been carried out under contract recommended by the Committee on Medical Research between the Office of Scientific Research and Development and Harvard University on products developed in the Department of Physical Chemistry, Harvard Medical School, from blood collected by the American Red Cross.

1. Cohn, E. J., Oncley, J. L., Strong, L. E., Hughes, W. L., Jr., Armstrong, S. H., Jr.: Chemical, Clinical, and Immunological Studies on the Products of Human Plasma Fractionation. I. The Characterization of the Protein Fractions of Human Plasma. *J. Clin. Invest.* (in press).

2. Dees, J. E.: Chemical, Clinical, and Immunological Studies on the Products of Human Plasma Fractionation. XVIII. Fibrinogen Coagulum as an Aid in the Operative Removal of Renal Calculi. *J. Clin. Invest.* (in press).

3. Cronkite, E. P., Lozner, E. L., Deaver, J. M.: Use of Thrombin and Fibrinogen in Skin Grafting. *J. A. M. A.*, 124:976-978, 1944.

4. Ingraham, F. D., and Bailey, O. T.: The Use of Products Prepared from Human Fibrinogen and Human Thrombin in Neurosurgery. *J. Neurosurg.*, 1:23-29, 1944.

5. Bailey, O. T., and Ingraham, F. D.: Chemical, Clinical, and Immunological Studies on the Products of Human Plasma Fractionation. XXII. Fibrin Films in Neurosurgery, with Special Reference to Their Use in the Repair of Dural Defects and in the Prevention of Meningocerebral Adhesions. *J. Clin. Invest.* (in press).

FIBRIN FILMS

Ferry and Morrison⁶ have developed methods whereby fibrin clots may be processed into films of any desired size and thickness. These fibrin films are translucent, flexible, elastic, and possess considerable tensile strength. The time required for absorption in situ may be varied from a few days to several months by changes in preparation, as has been shown by Singer and Morrison.⁷ Fibrin films of various weights have been made in several types: type P, the plain fibrin film; type F, a fibrin film with a backing of fabric; and types W and WF, which are type P or type F with a waterproof backing. This variety of film types has made them adaptable to a greater number of clinical uses.

The most important use of fibrin films has been in neurosurgery where the type P film has been found suitable for covering the brain when the dura mater is deficient either from accident or surgery. Ingraham and Bailey^{4, 5} have extensively studied tissue reaction to fibrin film in animals and humans. In monkeys (*Macaca mulatta*) the fibrin film was used to replace dura mater over untraumatized and traumatized cerebral cortex, under bone flap, and with bone removed. The same procedures were carried out in the presence of sulfadiazine and penicillin. The animals were sacrificed at intervals from one week to six months. In all cases the fibrin film proved an adequate dural substitute while repair took place. The film was seen to be replaced by a layer of fibrous tissue which was continuous with the remaining dura mater and free from adhesions to the cerebral cortex. The presence of sulfadiazine and penicillin had no effect on the speed or nature of the tissue reaction.

A basis for the use of fibrin films as dressings for thermal burns was obtained from studies of epithelization under fibrin clots carried out by Hawn et al.⁸ They made standard wounds on the backs of a large number of guinea pigs which were treated with various types of fibrin clots. These animals were sacrificed at intervals from a few hours after injury to complete healing. The authors found that the fibrinogen clots provided an environment which allowed rapid regeneration of epithelium.

Almost one year ago fibrin film was first used as a dural substitute in a human patient with lead encephalitis.^{4, 5} The original film was replaced at a second operation, and the second film has been in situ for nine months. Fibrin films have since been successfully used as dural substitutes in more than

6. Ferry, J. D., and Morrison, P. R.: Chemical, Clinical, and Immunological Studies on the Products of Human Plasma Fractionation. XVI. Fibrin Clots, Fibrin Films, and Fibrinogen Plastics. J. Clin. Invest. (in press).

7. Morrison, P. R., and Singer, M.: Chemical, Clinical, and Immunological Studies on the Products of Human Plasma Fractionation. XVII. Note on the Absorption Rates of Fibrin Films in Tissue. J. Clin. Invest. (in press).

8. Hawn, C. v. Z., Bering, E. A., Jr., Bailey, O. T., and Armstrong, S. H., Jr.: Chemical, Clinical, and Immunological Studies on the Products of Human Plasma Fractionation. XIX. The Use of Fibrinogen and Thrombin in the Surface Treatment of Burns. J. Clin. Invest. (in press).

50 human patients with brain tumors, congenital anomalies, lead encephalopathy, compound skull fractures, and Jacksonian epilepsy. Secondary operations and autopsies have provided material for histologic study recovered at intervals from fourteen hours to eighty-one days. Tissue reaction followed a pattern similar to that found in animals, and in no case has there been any evidence of cortical irritation or physiologic dysfunction usually associated with the formation of meningocortical adhesions. No meningocortical adhesions were found at secondary operations or in the few instances where autopsies were performed. From the limited evidence accumulated in the last nine months, they^{4 5} feel that fibrin films are better than any other dural substitute available at present. This can be confirmed only by the passage of time and the follow-up of early patients.

Similar fibrin films are being tried in the repair of peripheral nerve injuries. This work is still in experimental stages and no results are available at this time. Fibrin films, types P, F, and W, have been successfully used to treat a small number of second and third degree burns. Healing of burned areas covered with fibrin film in all cases was as rapid as control areas covered with vaseline gauze.⁸

FIBRIN FOAM

Fibrin foam for use with thrombin solutions has been developed by Bering⁹ to fill the need for a topical hemostatic agent which may be left in situ without fear of excessive or injurious tissue reaction. When dry, the fibrin foam is light, porous, and slightly brittle; when wet, it becomes soft, pliable, and somewhat resilient. Though the general physical properties may be varied over a considerable range, a foam most suitable for use in neurosurgery has been chosen as a standard. In vitro clotting of fibrinogen solution by pledgets of fibrin foam and soluble cellulose^{10 11 12 13} soaked in thrombin solution indicates that the foam is a much more effective matrix. The foam is highly effective as a clotting agent when used with solutions of only 10 thrombic units per cubic centimeter, while soluble cellulose to be equally effective must be used with solutions of at least 40 thrombic units per cubic centimeter.

Ingraham and Bailey^{4 5} have studied extensively the tissue reaction to fibrin foam in animals. In a large series of monkeys, foam was placed on the undamaged cerebral cortex,

9. Bering, E. A., Jr.: Chemical, Clinical, and Immunological Studies on the Products of Human Plasma Fractionation. XX. The Development of Fibrin Foam as a Hemostatic Agent and for Use in Conjunction with Human Thrombin, *J. Clin. Invest.* (in press).

10. Frantz, V. K.: Absorbable Cotton, Paper, and Gauze (Oxidized Cellulose), *Ann. Surg.*, 118:116-126, 1943.

11. Putman, T. J.: Use of Thrombin on Soluble Cellulose in Neurosurgery; Clinical Application, *Ann Surg.*, 118:127-129, 1943.

12. Unruh, C. C., and Kenyon, W. O.: Investigation of Properties of Cellulose Oxidized by Nitrogen Dioxide, *J. Am. Chem. Soc.*, 64:127-131, 1942.

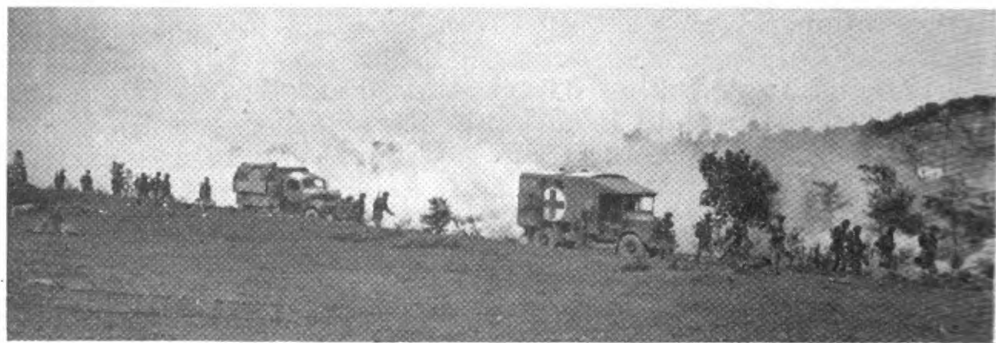
13. Yackel, E. C., and Kenyon, W. O.: The Oxidation of Cellulose by Nitrogen Dioxide, *J. Am. Chem. Soc.*, 64:121-127, 1942.

over traumatized cerebral cortex, and into the substance of the cerebral cortex. The same procedures were done with soluble cellulose and some of the same procedures were done with muscle.¹⁴ It has also been tried in the presence of sulfadiazine and penicillin. The local tissue reaction to soluble cellulose and to foam was minimal, but with muscle the reaction was considerably greater. The foam in most cases was gone in from two to three weeks, while the muscle persisted in some cases as long as six weeks. The presence of sulfadiazine and penicillin had no demonstrable effect.

As a hemostatic agent, fibrin foam has been particularly useful for dural oozing, especially under the margins of a bone flap. It has been lifesaving in several patients in whom the superior longitudinal sinus had been lacerated. After the removal of brain tumors, bleeding from the tumor beds is easily controlled by packing with thrombin-soaked foam. This allows *en bloc* removal of some tumors which are usually removed piecemeal at several operations. In one instance some thrombin solution got into the lateral ventricle without incident. The total number of patients in whom fibrin foam has successfully been used by the neurosurgeons of the Army, Navy, and civilian population is now more than 400.

Fibrin foam with thrombin has been used experimentally in general surgery to control bleeding from kidney, liver, spleen, lung, and heart. This type of usage has so far been limited to a few human patients. In a patient in whom a carcinoma of the stomach was invading the liver, an amputation of the left lobe of the liver was performed and hemostasis successfully effected by the use of fibrin foam and thrombin. In hemophiliacs it has proved of immense value in controlling bleeding from traumatic lacerations and in maintaining hemostasis during minor surgical procedures such as tooth extractions.

14. Ingraham, F. D., Bailey, O. T., and Nulsen, F. E.: Studies on Fibrin Foam as a Hemostatic Agent in Neurosurgery, with Special Reference to Its Comparison with Muscle, J. Neurosurg. (in press).



Moving up under the protection of smoke screen in Italy. Signal Corps photograph.

Original Articles

A Study of Parachute Injuries

MAJOR C. DONALD LORD

Medical Corps, Army of the United States
and

LIEUT. COLONEL JAMES W. COUTTS

Infantry, United States Army

While parachute jumps have increased, parachute injuries have proportionately decreased until at present a jumper has a chance of only about one percent of being injured in any one parachute descent. However, certain types of training injuries and jumping fractures have occurred repeatedly and several clinical entities are now recognized as typical parachute injuries. An "injury" has been chosen arbitrarily as a condition directly resulting from training which causes the student to lose one day or more from duty. Students with lacerations, contusions, exhaustive states, and minor sprains, who can be rehabilitated at the Parachute Medical Unit and returned to duty in a few hours, are not considered statistically as having "injuries." The parachute course of training consists of four stages:

"A" stage. Calisthenics, rope climbing, running, and jumping from 4- to 6-foot platforms into sawdust pits.

"B" stage. Tumbling, trainasium, landing trainer, jumps from mock doors (4 to 6 feet), jumps from mock towers (30 to 35 feet), and suspended harness drill.

"C" stage. Daily jumping from 250-foot towers (free and controlled) and landing by parachute on sawdust. Tumbling is reviewed and parachute control is practiced.

"D" stage. From a plane in flight, the landing being made on level and uneven terrain, the applicant makes the necessary number of plane jumps to qualify as a parachutist.

The physical hardening accomplished through "A" stage training puts most applicants at something near physical perfection which makes them less prone to develop fear phenomena in the apparatus of the next three stages.

The right rectus muscle strain or tear has proved to be the most frequent cause of disability in "A" stage training and the most interesting since it closely simulates acute appendicitis. This occurs in rope climbing, presumably when the lower extremities are raised at right angles to the body and the legs grasp the rope, as shown in figure 1.

From the Parachute School, Fort Benning, Georgia. The X-ray and Orthopedic Services at the station hospital, Fort Benning, cooperated in this study. The Post Signal Photo Laboratory, Fort Benning, and Base Photographic Section, Lawson Field, produced the photographs. The figures quoted were obtained from the official records of the Parachute School.

In attempting to reach the top of the rope, the strong effort made in some cases apparently causes a sharp pain in the abdomen. At the Parachute Medical Unit, the patient complains of the pain, he walks slightly flexed at the hips, and the simple act of getting on the examining table is difficult because of the pain. When patient is standing, the abdomen appears relaxed. In cases with hematoma formation a bulge can be seen along the course of the rectus muscle. Subcutaneous ecchymosis appears in four to seven days extending downward from the point of maximum tenderness. The muscle is exquisitely tender on light palpation. When the body is raised from the

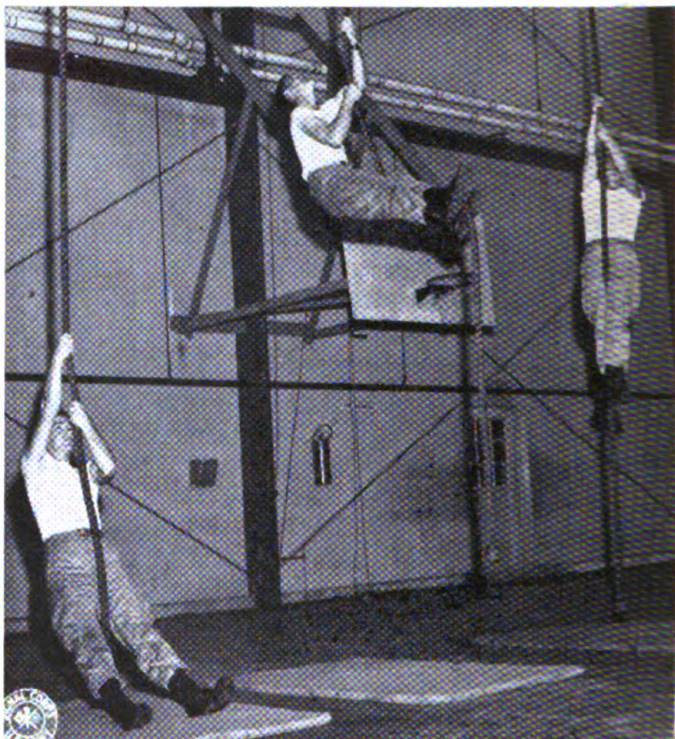


FIGURE 1. Illustrating the mechanism of the "right rectus muscle strain or tear."



FIGURE 2. Tumbling from the "landing trainer." Arrow indicates point of most forcible contact with ground. If improperly executed, the point of shoulder strikes with greatest force resulting in acromioclavicular injury.

prone position with the lower extremities flat on the table, the pain is severe. Ninety percent of these cases are in the right rectus and 10 percent in the left, apparently caused by greater effort being exerted by the right side. A white blood count of 9,000 to 11,000 occurs the day following the injury, the polymorphonuclear leukocytes ranging from 70 to 80 per-

Photographs (figures 1 to 7) by U. S. Army Signal Corps.

cent. Now that the cause is known the diagnosis is readily made, but many have been hospitalized for observation for appendicitis and one case was operated on. The wound was closed and the appendix not removed. A hematoma below the rectus was found.

Since tumbling is effective in disseminating the shock when contact is made with the ground, the proper technique of tumbling is drilled into applicants over and over daily. This emphasis on tumbling leads to the typical injury of stage "B," the acromioclavicular contusion and the acromioclavicular separation. Two training situations involving tumbles which are being properly executed are shown in figures 2 and 3.



FIGURE 3. Illustrating in greater detail the mechanism of acromioclavicular injury.

The shoulder tip should not touch the ground; the forearm held rigidly by the triceps acts as a bar over which the body rolls. When the triceps are relaxed, the shoulder comes in direct contact with the ground at point "X," indicated by the arrow, and the acromioclavicular injury occurs. Separation of the acromioclavicular joint in these injuries involves only the tearing of the articular capsule in some cases, the coracoclavicular ligaments remaining intact and preventing the scapula and acromion from being displaced downward. In severe cases the capsule and the coracoclavicular ligaments are torn, and the acromion being completely separated from the clavicle is dis-

placed downward by the weight of the upper extremity. In figure 4 the acromioclavicular separation is marked but the scapula and acromion are depressed only slightly.

In this case it was felt that the coracoclavicular ligaments were stretched but maintained the connection to the clavicle, and it was treated with a block in the axilla strapped to the body, an additional strap extending up over the lateral end of the clavicle over the shoulder and down posteriorly to be attached to the block behind the



FIGURE 4. X-ray illustrates typical acromioclavicular separation.

axilla. The elbow was raised by means of a sling. This patient returned to full jump duty after five months and has qualified as a parachutist with no symptoms referable to the shoulder. The less severe injury, namely, the simple acromioclavicular separation with slight, if any, tearing of the capsule, responds to immobilization of the upper arm and shoulder for two to four weeks. Such cases are ready for full parachute duty in this length of time with no treatment other than physiotherapy and rest.

In the "C" and "D" stages of training the injuries have a common cause, which is landing by parachute. The injuries are more frequent in "D" stage, but they involve the same mechanism. Of the two typical parachute leg injuries, the first is the double fracture involving the lower third of the fibula and the posterior lip of the tibia. The mechanism of this fracture is explained on the basis of a double force. The foot is rotated externally and forced posteriorly on con-

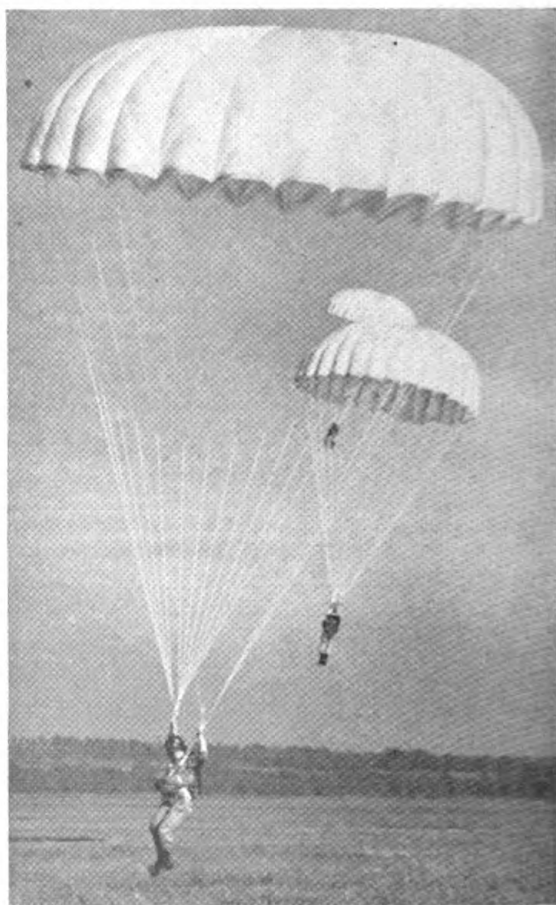


FIGURE 5. Parachutists in descent. Preparation for ground contact has been properly made.

tact with the ground. When the foot is rotated externally, the anterior portion of the body of the astragalus presses against the anterior border of the inner surface of the external malleolus forcing it outward and backward. If the inferior tibiofibular ligament remains intact and the force is sufficient, it tends to cause an oblique fracture of the lower end of the fibula about two inches above the tip. The posterior force is the result of the forward motion of the foot as it strikes the ground. The impact is transmitted up the metatarsals, through the tarsus, forcing off the posterior tibial lip. In the presence of a ground wind and with oscillation at the time of landing, a more violent eversion of the ankle may occur resulting in the trimalleolar fracture described by Lewin.¹ In these cases fracture of the internal and external malleoli and the posterior tibial lip occurs. This trimalleolar fracture however is less frequent than that involving the fibula and posterior tibial lip alone. The foot and leg position and landing attitude as the parachutist approaches the ground are shown in figure 5.

Fractures of the ankle involving the usual lower end of the fibula and posterior tibial lip and also the internal malleolus, which occur in the more violent eversions of the ankle with landing, were common prior to recent changes in landing attitudes. The original parachute fracture described above has begun to be replaced by a fracture of the upper third of the fibula or dislocation of the fibula head.

This is due to the greater support of the ankle by having both feet held firmly together at the moment of striking the ground. Since the latter injury is simpler to handle surgically and the convalescent time is less, this is considered a favorable change.

This second typical parachute injury we have called the "silent fracture," since frequently the patient will exhibit few if any symptoms. Sometimes the fracture will occur during "C" stage training and the soldier will proceed with the actual plane jumps of "D" stage training before he reports for

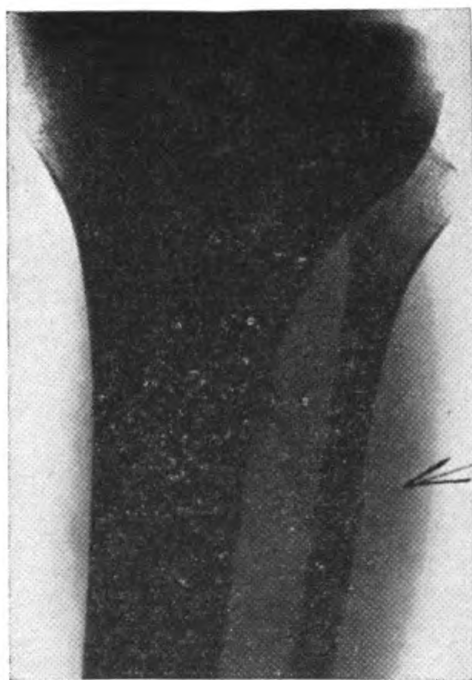


FIGURE 6. Illustrating the so-called "silent parachute fracture" of upper fibula. The term "silent fracture" has been coined to indicate the relatively painless nature of this fracture.

1. Lewin, Philip: *The Foot and Ankle*, 2d ed., 665 pp. Philadelphia: Lea and Febiger, 1941.

medical care. Thus a fracture of the upper third of the fibula could very frequently be misdiagnosed as a sprained muscle, if the possibility of this "silent" fracture were not kept in mind. Such relatively painless pathology undoubtedly can occur only because the fibula does not enter into weight bearing. Among thirty-five cases diagnosed recently, only ten reported for treatment at the time of the fracture. The other twenty-five reported for "slight pain" in the upper outer aspect of the leg seven to thirty days after the injury. Many showed marked callus formation at the original x-ray. Some cases of fractured upper third of the fibula probably are never diagnosed as fractures. They have become more frequent in our series as the lower fibula fractures decrease with the ankle support afforded by landing with the feet and ankles held firmly together.

A small number of dislocations of the fibular head have occurred but they are becoming more frequent as the ankle injuries diminish in frequency. Figure 7 shows the fibular head



FIGURE 7. Typical fibular head dislocation. Here as in the "silent fracture" we note a minimum symptomatology. These dislocations are infrequent.

in a dislocated position. The sideward landings which occur in oscillations result in a tendency to "spring" the fibular head from its position or fracture it in the upper third.

The possibility of backward, forward, outward, or upward dislocation of the fibular head has been mentioned.² The dislocations of the fibular head occurring in the parachute landings are primarily lateral dislocations resulting from the "springing" action described. The attachment of the tendon of the biceps femoris would tend to dislocate it posteriorly and

2. Key, John Albert, and Conwell, H. Earle: *The Management of Fractures, Dislocations, and Sprains*, 3d ed., 1303 pp. St. Louis: C. V. Mosby Co., 1942.

upward, but we have not seen this happen. The diagnosis is not difficult since the bone can be readily palpated. These dislocations are sometimes reduced on the jump field by the ambulance surgeon or at the parachute medical unit after x-ray by strong inversion of the foot and direct pressure over the fibular head. An elastic bandage is applied and the patient put on crutches and kept ambulatory. We have seen no evidence of peroneal nerve involvement. One medical officer in parachute training having a dislocated fibular head reported numbness of the foot lasting several days after the accident; but there was no muscle weakness nor foot drop. We are of the opinion that with slight or moderate dislocation of the fibular head no pressure is exerted on the nerve. Furthermore, reduction is accomplished very early in these cases and if pressure on the nerve does occur, it is relieved promptly.

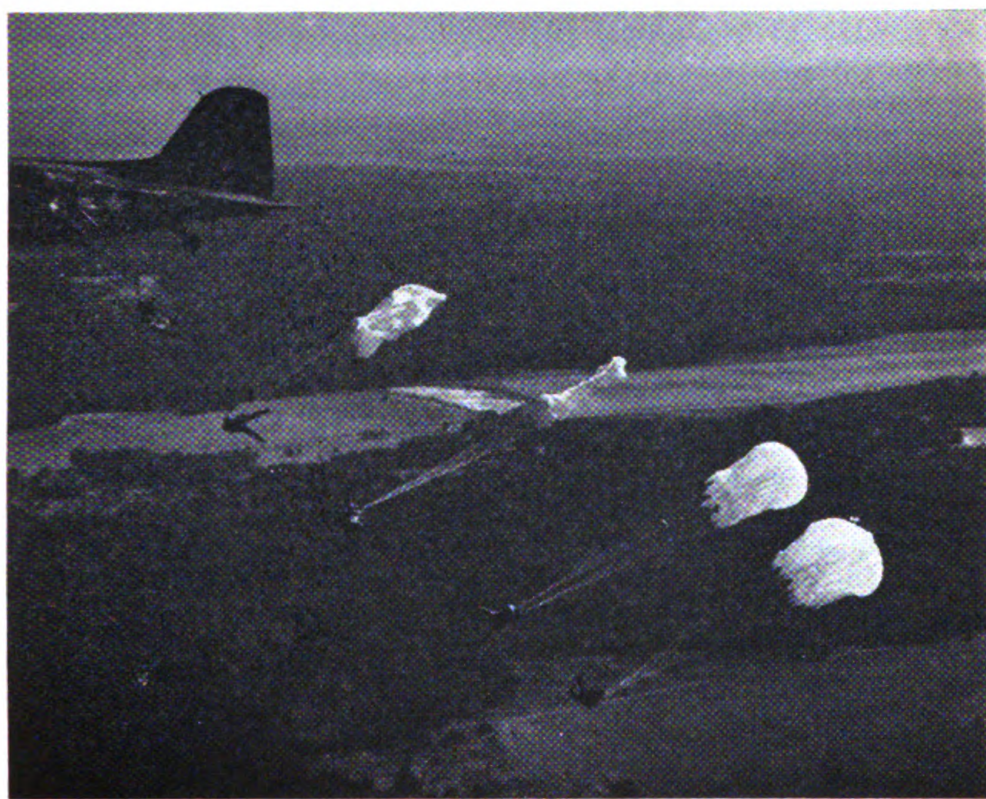


FIGURE 8. Parachutists in various stages of the plane exit. It is at this moment that occasional freak accidents occur.

These two clinical syndromes, one involving the ankle, the other involving the upper fibula, are showing signs of persistency of occurrence with thousands of jumps weekly, and are now considered classical parachute entifies.

With the opening shock of the parachute while the soldier is falling freely, any type of fracture or injury may occur if

Official photograph U. S. Army Air Forces.

the body position is incorrect. The most unusual was a deep laceration of the perineum extending from the scrotum to and involving the sphincter ani and exposing the lower segment of the rectum. This was caused by the parachutist doing a forward somersault in the air with his legs apart before the parachute opened. The suspension lines went between his legs. When the parachute opened in the propeller blast, the great force of the taut suspension lines was exerted on the perineum causing the deep laceration described. When the body position is normal, this great opening force is directed to the body harness from the suspension lines. This accident probably occurred because the parachutist "dived" rather than "jumped" from the plane in flight, and because he neglected to keep his feet and legs together at the exit. While such cases are rare, they show the hazards involved when the rules are not followed.

CARE OF THE INJURED

The fractures discussed here are seen long before swelling has time to occur, because of the preparedness for the immediate handling of injuries which exists at the Parachute School. Frequently fractures can be palpated by the examining physician before the obscuring action of edema has intervened. Injuries occurring in the first three stages of training are picked up by the ambulance from the Parachute Medical Unit within a few minutes after the injury. The jumping injuries that occur in "D" stage are handled as follows: On the jumping field there is an aid man assigned to watch the descent of every parachutist and he is within six feet of him when the parachutist lands. If there is any evidence of injury, the aid man unfolds a red flag and an ambulance responds immediately. The injured member is splinted and the patient transported to the medical unit where x-rays are taken. When possible, if no fracture exists, ambulatory treatment is encouraged. Patients with fractures are admitted to the hospital; those with sprains, regardless of their severity, contusions, and the like, are supplied with crutches and kept mobile.

The Parachute Medical Unit has made studies to determine the advisability of novocain injection of sprains. The immediate relief of discomfort by this method cannot be disputed; however, with early icing, tight binders, and the use of crutches for twenty-four hours, the pain is not troublesome. Novocain injection has definite value in chosen cases with severe pain or in those who must walk immediately, but in our present method of treatment the great majority are not injected with novocain. The length of disability has not been shortened by novocain injection in our series. This may be due to the fact that almost complete healing is required before a soldier is permitted to return to jumping status. In the first twenty-four hours, tight bands, icing, and immobilization are the preferred treatment. After the first twenty-four hours,

warm applications, gentle massage, and early active motion are the course followed. The Physiotherapy Department in the Parachute Medical Unit cares for hundreds of men daily, using infra-red lamps, ultraviolet rays, whirlpool baths, alternating hot and cold baths, and massage.

NEW TRAINING TECHNIQUES AND THE DIMINISHING INJURY RATE

Certain revisions of the landing method taught at the school are partly responsible for a distinctly diminishing injury rate. The decrease was accomplished in spite of an increase in the training load of the school since July 1943. The revision of technique entailed:

1. Landing with the feet together, legs bent slightly at the knees, and the weight of the body slightly forward over the feet. Legs are held so that the knees are together. The muscles are not tensed, yet not relaxed. The leg muscles are alert to take up the landing shock.

2. A variation of previously taught tumbling technique so that proper landing can be made during ground approaches that are angular to the line of drift during a parachute descent. It was discovered that although the desired approach was a forward drift when landing (see figure 5), in a large percentage of instances, backward or oblique landings occurred. Further diminution of the injury rate was accomplished by exacting supervision of each student during this period of training before entering "D" stage. Careful attention to the maintenance of all equipment and training aids had some value.

A study of the parachutists in figures 3 and 5 shows the value of the training the candidate receives in stages "A," "B," and "C." Figure 5 indicates lessons in landing technique that were properly learned. In the early days of parachute training when the student load on the school was small, the assistant commandant was able to select the most favorable weather when jumping his novices for qualification. However, when it became necessary for the school to increase the output, it became increasingly difficult to pick ideal jumping weather for the novice. The decreased injury percentage appears all the more remarkable in view of these conditions.

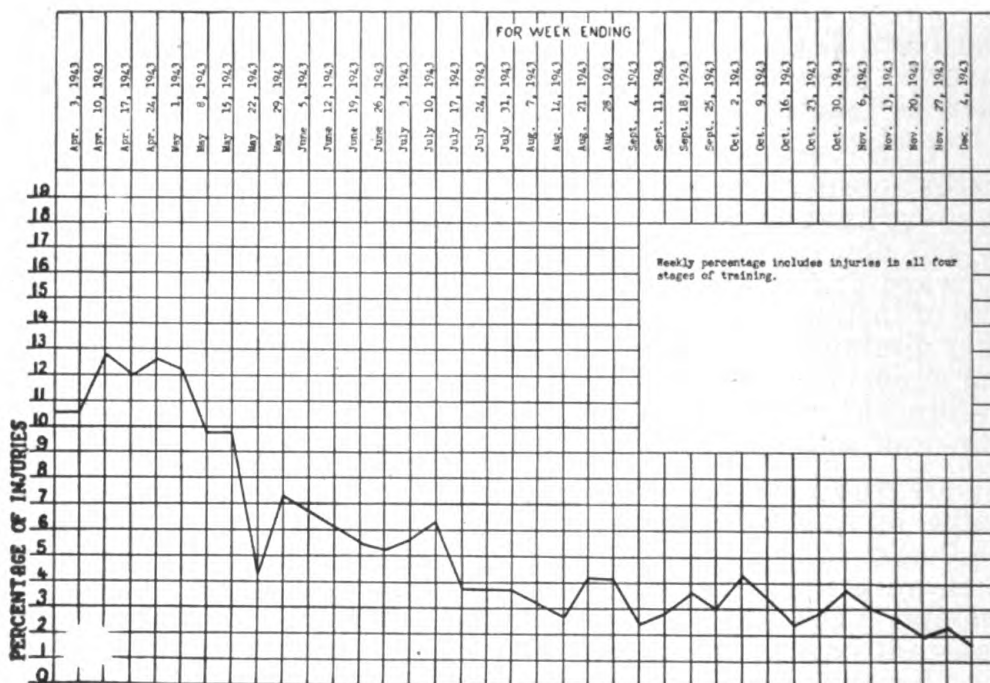
Strong ground winds frequently set up a pendulum-like motion of the parachutist, in which the apex of the parachute is the fixed, and the parachutist himself the moving end of the pendulum. This swinging motion or oscillation can reduce the parachutist's opportunity to land uninjured. When the old method of landing was taught, the novice's feet were about the width of the hips apart when landing. It is apparent that a sideward oscillation would bring the landing shock of all the body's weight on one or the other foot. This increased the possibility of sprain or fracture. The new method of landing,

with the feet together, distributes the landing shock with almost perfect equality to both feet and legs, when coming in for an oscillating landing. Careful records of many injuries permit the preparation of chart 1.

The new method of landing was inaugurated in the "A" stage on 12 June 1943 and since then a marked decline in the combined weekly injury percentage has occurred. This average was not subjected to the violent fluctuations which characterized it previously. Comparison of the 1943 seasonal averages with those of 1942 reveals that in each case the combined percentage is lower.

CHART 1

Combined weekly injury report for all stages



Note that all injuries, both in the jumping stage and the pre-jump training stages, have been materially decreased.

CHOOSING PARACHUTE PERSONNEL

The selection of parachute personnel is done with utmost care. Incoming applicants to the school have first been examined by their unit medical officer who has a copy of the physical requirements for parachute admission. On admission to the receiving battalion at the Parachute School, all men are subjected to an examination system which rules out anatomically and psychologically poor material. The men are passed through a series of rooms and individually examined from a

Photograph of chart by U. S. Army Air Forces.

psychiatric viewpoint, with stress on various phobias for the detection of any lack of desire for this training. They proceed through the stages of the physical examination. Stress is placed on anything which is symptomatic at present, such as old lumbosacral sprains, painful fractures, retracting scars, and any history of symptoms referable to the head, such as dizziness, black-outs, and fainting spells. Potential hernias, heart murmurs, unless definitely proved functional, and all cases of questionable visual acuity without glasses unless vision is 20/40 or better bilaterally are ruled out. Venereal disease disqualifies a man on the original examination. If venereal disease is contracted during training, the soldier is immediately disqualified. Luetics who have had adequate treatment and whose blood and spinal fluid serology is negative are acceptable. The elimination of these conditions results in between 10 and 15 percent rejections of all applicants to the school. Further selection is accomplished through observation by the stage leaders of hesitancy or inability to perform some of the preliminary low jumping procedures. These standards result in accepting the best men available. Physically perfect men are less prone to injury in training. Some of the diminishing injury rate therefore is accredited to the increasing severity of selection standards.

The four typical physical injuries summarized are parachute entities, proved by their repeated occurrence in soldiers taking this course. Their frequency has been reduced in the past six months, and those occurring now are incidental to the production of qualified parachutists.

CONCLUSIONS

1. This survey covers parachute descents in excess of 250,000.
2. Statistically, any parachutist's chance of injury in any one parachute descent is only one percent, and this figure is decreasing.
3. Some typical medical parachute entities are now established: right rectus muscle strain; acromioclavicular contusions and separations; fracture of the lower third of the fibula associated with fracture of the posterior tibial lip; the "silent fracture" of the upper one-third of the fibula—and less frequently a dislocation of the fibular head. The fibula can be fractured in its upper one-third and be relatively asymptomatic; hence, the designation—"silent fracture."
4. Holding the feet together on contact with the ground, replacing the old method of holding the feet 18 inches apart on landing, has reduced ankle fractures.

Complications of Meningococcic Infections

Analysis of 100 Cases

CAPTAIN PAUL S. STRONG

Medical Corps, Army of the United States
and

CAPTAIN JOSEPH L. HOLLANDER

Medical Corps, Army of the United States

Evidence is accumulating to show that the use of the sulfonamides in the treatment of meningococcic infections has drastically reduced the mortality and has greatly decreased the incidence and severity of the complications and sequelae.^{1 to 4} This has been our experience at the station hospital at Fort Eustis. Following is a report of 100 consecutive cases treated between January 1942 and July 1943. Among these cases 7 were classified as fulminating,* 27 as very severe, 13 as moderately severe, and 53 as mild. All of these cases received sulfonamides and 19 were given specific antisera, also. Two cases considered fulminating died, one within twenty-four hours. The diagnosis was not confirmed bacteriologically in this case, but there was no doubt about the nature of the illness from a clinical standpoint. The second patient did not respond to intensive chemotherapy and expired before the end of thirty-six hours with a complicating acute nephritis. The other important complications were arthritis, cranial nerve paresis, and psychoneurosis. (Table I)

The complications and sequelae were rare. The most frequent disabling complication in our series was arthritis. Eleven patients had definite joint symptoms during the course of the disease. Seven of these who had arthralgia at the onset of their illness, recovered completely without joint swelling or signs of joint suppuration. The four cases of suppurative arthritis developed joint symptoms and signs after the fourth

*The term "fulminating" was used to designate cases admitted in profound shock and showing widespread and extensive petechial and purpuric rashes.

1. Cushing, R. W.: Cerebrospinal Fever, Analysis of 124 Cases, *Brit. M. J.*, 2:439, 5 Oct. 1940.

2. Harries, G. E.: Cerebrospinal Fever, *Brit. M. J.*, 10:423, 10 Oct. 1942.

3. Banks, H. S.: Cerebrospinal Fever, *Lancet*, Lond., 1:42, 6 Jan. 1940.

4. Brinton, D.: Cerebrospinal Fever. Baltimore: The Williams and Wilkins Co., 1941.

day of the disease. At this time redness, swelling, tenderness, and in some cases effusion were noted.

The treatment in the acute stage of arthritis consisted of intensive chemotherapy, aspiration of demonstrable effusion, and immobilization of the affected joint. Subsequent or rehabilitative treatment consisted of physiotherapy—heat, massage, passive motion, and supervised exercise.

CASE REPORTS

CASE 1. A white soldier, aged 38, gave a history of cough, substernal pain, chills, fever, and sweats for three days. Physical examination revealed a mildly ill patient whose only significant findings were a red throat and postnasal discharge. The skin was clear. No nuchal rigidity was present. There was no penile discharge or evidence of prostatitis. During the first four days in the hospital the temperature was elevated. On the fourth day a petechial rash was observed about the wrist and ankles, and the left knee was swollen, red, and tender. The metacarpophalangeal joint of the left fifth finger and the right elbow joint were acutely inflamed. Effusion was demonstrated in the right elbow and the left knee. The spinal fluid was clear and sterile on culture. A blood culture was sterile. Aspiration of the left knee joint yielded 20 cc. of greenish, purulent fluid containing innumerable pus cells and many gram-negative diplococci both intra- and extracellular. *Neisseria intracellularis* Group I was grown from this fluid. The joints were immobilized and chemotherapy was begun. The administration of 9 gm. of sulfadiazine per day main-

TABLE I

Complications observed in 100 cases of meningococcic infections

	No. of cases
Arthritis { Arthralgia	7
{ Suppurative arthritis	4
4th nerve paresis	1
Psychoneurosis, hypochondriacal type	1
Nephritis	1
Epididymo-orchitis	1
Herpes simplex	15
Deaths	2

tained an average daily blood level of 7.5 mg. percent. Five days after the beginning of sulfonamide therapy, the left knee was again aspirated and 65 cc. of greenish purulent fluid obtained but culture failed to reveal the organism.

In spite of sulfonamide therapy, a septic temperature curve persisted for fourteen days. The swelling of the knee subsided gradually without further aspiration. On the nineteenth hospital day the right elbow and the left fifth finger appeared normal, but slight residual swelling and tenderness persisted in the left knee. No effusion could be demonstrated and sulfonamide therapy was discontinued. Slight swelling, definite crepitation, stiffness, and pain on motion in the left knee persisted long after all other signs of the infection had disappeared. Physiotherapy in the form of baking and increasing passive and active exercise was carried out. After six weeks of convalescent care, an x-ray of the left knee revealed extensive demineralization and narrowing of the joint space. A persistently elevated erythrocyte sedimentation rate was noted. Flexion of the knee was still painful and the joint stiffened markedly after rest. It became apparent that the changes in the knee constituted a permanent disability and a discharge from the Army was arranged.

CASE 2. A white soldier, aged 20, was admitted with a history of headache, stiff neck, chills, fever, and pains in both legs of one day's duration. Examination revealed a temperature of 101° ; pulse, 92; and respirations, 24. A widespread maculopapular and petechial rash was seen on the trunk and extremities. Slight nuchal rigidity was present. There was no penile discharge. A lumbar puncture revealed clear fluid sterile on culture. One blood culture was sterile.

The administration of 9 gm. of sulfadiazine per day maintained a blood level ranging from 6.6 to 14 mg. percent over a nine-day period. On the fourth day the right knee became red, tender, and swollen. Aspiration yielded 30 cc. of greenish purulent fluid which on smear showed many pus cells and numerous gram-negative intracellular diplococci. Culture of the fluid was sterile. The joint was immobilized and chemotherapy was continued with progressive improvement. On the fourteenth hospital day, the right knee appeared normal. The patient was given a short course of physiotherapy following discharge and was then able to do full military duty.

CASE 3. A white soldier, aged 22, was admitted with a history of generalized aches and pains, fever, chills, headache, and vomiting of two days' duration. Examination showed a temperature of 100.8°; pulse, 120; respirations, 30; and a general petechial rash. The neck was moderately rigid and the Kernig and Brudzinski signs were positive bilaterally. There was no penile discharge. A lumbar puncture revealed 5,450 white cells per mm.³ with 90 percent neutrophils. The cultures of both spinal fluid and blood were sterile.

The administration of 9 gm. of sulfadiazine per day maintained an average blood level of 8.3 mg. per 100 cc. for eleven days. On the fifth day the meningeal signs had disappeared, but there was swelling and tenderness of the left knee joint without redness or evidence of any large effusion. The joint was immobilized. Concomitant with the swelling of the knee, the epididymis on both sides became swollen. At the end of two weeks, the knee joint appeared normal, the epididymitis had subsided without suppuration, and the patient was returned to full duty three weeks later. One month following discharge, he was readmitted because of recurrence of swelling and effusion of his left knee. The knee was immobilized in plaster for three weeks, at the end of which time the fluid had absorbed. Stiffness and soreness of the knee persisted, however, and a definite crepitation on motion was still noted six months after the illness, even though no bony changes were evident on roentgenography. This soldier has been able to perform only light duty since his illness.

CASE 4. A colored soldier, aged 19, was admitted to the hospital complaining of sore throat, chills, fever, weakness, and headache of three days' duration. Examination revealed an acutely ill patient with a temperature of 102°; pulse, 80; and respirations, 20. A petechial rash was present about both ankles. The neck was stiff and the Kernig and Brudzinski signs were positive. There was no penile discharge. A lumbar puncture revealed cloudy fluid which on smear and culture showed *N. intracellularis*. The blood culture was sterile.

Treatment including intravenous sodium sulfathiazole and oral sulfadiazine was continued for seven days. On the sixth day of the disease and the third day after specific treatment was instituted, the left ankle became swollen, red, and tender. No effusion could be demonstrated and aspiration was not performed. The ankle was elevated and immobilized and it re-

TABLE II
Four cases of suppurative meningococcic arthritis

Case	Type of infection	Days of disease arthritis was present	Joints involved	Signs	Bacteriologic findings	Result
1	Mild septicemia	5th to 19th	Left knee, right elbow, metacarpophalangeal joint of left 5th finger	Redness, swelling, tenderness, and effusion	<i>N. intracellularis</i> Gp. I from synovial fluid of left knee	Residual synovitis and incapacity
2	Moderately severe septicemia	4th to 14th	Right knee	Redness, swelling, tenderness, and effusion	Gram-negative diplococci on smear from fluid in left knee. Culture negative	Complete recovery
3	Moderately severe meningitis	5th to 19th	Left knee	Swelling, tenderness, but no redness or effusion	Spinal fluid purulent but no growth	Residual chronic synovitis with partial incapacity
4	Very severe meningitis	9th to 21st	Left ankle	Redness, tenderness, swelling, but no definite effusion	<i>N. intracellularis</i> Gp. I from spinal fluid	Complete recovery

turned to normal in twelve days. A follow-up four months after his discharge from the hospital revealed that the soldier was doing full military duty without any disability.

DISCUSSION

During World War I complications and sequelae resulting from meningococcic infections were relatively common. The case fatality ranged from 30 to 50 percent in different series, and sequelae, especially deafness and ocular paralysis, were common. De Sanctis,⁵ quoting the literature up to 1933, stated that 18 percent of all cases of meningococcic meningitis developed sequelae and of these 42 percent resulted in deafness. Eighteen percent of 337 cases reported by Neal et al.⁶ in 1932 showed sequelae, many of which were of a serious nature.

In contrast to these reports are those which have appeared since the introduction of the sulfonamides. Cushing¹ in 1940 reported a case fatality of 3.2 percent among 124 soldiers. All but 6 of the recovered 120 were able to do military duty although a number of them required long periods of readjustment. In 1942 Harries² reviewed 500 cases of meningococcic meningitis and noted relatively few complications. In a review of over 3,000 cases of meningococcic meningitis, including all age groups, Beeson and Westerman⁷ found complications infrequent. The three most common complications were cranial nerve paralysis in 3 percent, arthritis in 2.7 percent, and deafness in 2 percent. More than half of the cases with arthritis and cranial nerve paralysis recovered completely before discharge from the hospital. Hodes and Strong⁸ as well as Banks⁸ found complications rare except for deafness. Series which include children will undoubtedly continue to show a higher incidence of deafness as the child's auditory apparatus seems to be especially vulnerable to attack by the meningococcus. Brinton,⁴ checking a large number of men from the R.A.F. months after their treatment in other hospitals, noted only one case of permanent deafness and this involved only one ear. No cases of deafness, either temporary or permanent, were encountered among the 100 cases reported here.

5. De Sanctis, A. G.: Epidemic Cerebrospinal Meningitis in Children; Critical Review of 44 Cases, *Med. Clin. N. America*, 17:109, July 1933.

6. Neal, J. B., Jackson, H. W., and Applebaum, E.: Infections of the Central Nervous System. Baltimore: The Williams and Wilkins Co., 1932.

7. Beeson, P. B., and Westerman, E.: Cerebrospinal Fever. Analysis of 3,575 Case Reports with Special Reference to Sulphonamide Therapy, *Brit. M. J.*, 497, 24 Apr. 1943.

8. Hodes, H. L., and Strong, P. S.: Treatment of Meningococcic Meningitis with Sulphonamides, *J. A. M. A.*, 119:691, 27 June 1942.

Other than in fatal cases, no relation could be established between the severity of the disease and the incidence of complications. It was believed that some break in the local tissue resistance accounted for the complications. It was difficult, however, to explain such complications as suppurative arthritis, when they occurred during a period of time when the blood concentration of the sulfonamide was well above the optimum therapeutic level. Bauer et al.⁹ and Cattell¹⁰ reported similar cases in which suppurative arthritis developed in spite of intensive chemotherapy. Cattell suggested that, in his case, a refractory strain of the meningococcus might have been responsible for this apparent resistance to specific therapy.

Herrick and Parkhurst¹¹ separated the types of arthritis associated with meningococcic infection into (A) the early type, a transitory, hemorrhagic, polyarthritis, and (B) the subsequent or independently occurring monoarticular suppurative arthritis. The transient arthralgia noted in our cases, we believe, correspond to type A, and the suppurative arthritis to type B. The careful work of Keefer, Parker, and Myers¹² has demonstrated clearly the pathologic changes in meningococcic joints. They did an autopsy on a patient with meningococcal meningitis who had had no symptoms or physical signs referable to the knee joint and found gram-negative diplococci and acute inflammatory changes in the deeper layers of the synovium. The surface layer of the synovium was intact, and the joint cartilages were unaffected. Their second patient who had a suppurative arthritis of the knee showed evidence of swelling and necrosis of the surface layer of the synovium with heavy surface infiltration of polymorphonuclear leukocytes, but no penetration into the deeper layers of the synovium. Keefer and his co-workers concluded that "Meningococcic arthritis is a metastatic lesion involving first the deeper synovial tissues. Later, infection invades the superficial cells with effusion of fluid into the joint cavity and varying degrees of destruction of the cartilage. It is essentially a

9. Bauer, W., Ropes, M. W., and Short, C. L.: Treatment of Infectious Arthritides with Sulphonamide Compounds, *Med. Clin. N. America*, 26:1529, Sept. 1942.

10. Cattell, J. P.: Meningococcal Meningitis with Purulent Arthritis, *N. England J. M.*, 229:49, 8 July 1943.

11. Herrick, W. W., Parkhurst, G. M.: Meningococcus Arthritis, *Am. J. M. Sc.*, 158:473, Oct. 1919.

12. Keefer, C. S., Parker, F., Jr., and Myers, W. K.: Histologic Changes in Knee Joint in Various Infections, *Arch. Path., Chic.*, 18:199, Aug. 1934.

metastatic acute synovitis." We feel that the clinical course of our cases tends to support this explanation of the pathogenesis of the suppurative disease in the joint. The fact that the tissues are not highly vascularized in the affected area might explain why more prompt response to chemotherapy was not attained.

A problem not encountered in civilian practice is a formidable obstacle to the military surgeon treating illnesses of prolonged and serious nature. It concerns the preparation of the soldier, physically and mentally, to return to the hardships of military life within a minimal time. This must be accomplished by a planned type of convalescence which will discourage malingering and the development of psychoneuroses and which at the same time will favor the prompt restoration of health. The length of hospitalization of the cases in this series varied from 3 to 6 weeks with an average of 4 weeks. Most of the patients received sick furloughs of from 10 to 21 days, making a maximum loss of service of 9 weeks, a minimum of 31 days, and an average of 6 weeks. Experience demonstrated that furloughs of longer periods than 2 weeks, except in a few instances, made the readjustment necessary on return to duty much more difficult.

SUMMARY

Two deaths occurred among 100 cases of meningococcic infection treated at the station hospital. All received the sulfonamides and 19 were given additional specific antisera.

Of the 98 soldiers who recovered, 88 were reported as feeling excellent or good at the end of two weeks of duty, 2 were found to be good but weak, 1 was given a discharge, 1 was placed on limited service because of chronic arthritis resulting from his illness, 1 had to be discharged because of a psychoneurosis which appeared following his meningitis, 1 was placed on limited service because of a fourth nerve paresis, and 4 were discharged because of some disability which existed prior to their entrance into the Army.

Complications and sequelae were infrequent. The most common disabling complication was suppurative arthritis of which there were four instances in this series; two of these made complete recoveries, and the other two sustained permanent damage to their knee joints.

Diarrheal Diseases in U. S. Troops in Belgian Congo

CAPTAIN CRAWFORD D. DUNHAM
Medical Corps, Army of the United States
and

CAPTAIN WILLIAM H. GILLESPIE
Medical Corps, Army of the United States

Diarrheal diseases, notably bacillary and endamebic dysenteries, are prevalent in areas in which the sanitation is primitive and where insect vectors are numerous. United States Army troops arrived at a city in the Belgian Congo with forty-five hundred European and fifty thousand native inhabitants and established a camp nearby. Many opportunities for the spread of intestinal infections among the troops were present.

For a few months the troops were to sleep in tents and to use food prepared in poorly screened kitchens. The pit latrines were screened at the outset. Flies were numerous. The reservation was a broad expanse of elephant grass with marshland on one side and, on the other, a small river which frequently overflowed. Dust was always present. A native village and a Congolese military camp were within fly-range of Army kitchens and barracks. The local abattoir was a half-mile away. Native huts were scattered in the bush near camp. Cattle and pigs were free to roam from a corral and sty near the reservation.

Bacillary and endamebic dysentery were prevalent among the townspeople. Among the black populace the mortality from endamebic colitis was high. On any morning in the two government dispensaries in town, seven of every ten stool examinations would be positive for helminth ova or pathogenic protozoa. Cases of bacillary dysentery were numerous in the "black hospital," and outpatients under treatment for intestinal infections were not isolated. Stool cultures were not taken on cases showing microscopic pus, mucus, and blood. The blacks used any plot of ground as a latrine. Many European residences were serviced by insanitary septic tanks.

The soldiers made friends among the townspeople and many meals were eaten outside Army mess halls. The town had ten

restaurants, all at first patronized by soldiers, officers, and nurses, and all employed natives as food handlers. Examination of food handlers was alleged to take place periodically, but there was no record of any effort to treat carriers. The kitchens of some restaurants, by Army standards, were unclean. In one local bakery, native workers in bare feet scuffed around the unswept floor where uncovered loaves of bread were stacked.

The nurses were billeted in a hotel for two and one-half months and many contracted febrile diarrhea. Four were admitted to the hospital with bacillary dysentery, and one died of a fulminating infection. Later routine carrier stool examinations were done on officers and nurses, and two nurses were found to be healthy carriers and were treated. Previously two other nurses had been hospitalized because of diarrhea due to *Endamoeba histolytica*. These infections among nurses were contracted during a period when the serving of food and the sanitary conditions of living were not under Army control. It was diplomatically impossible to suggest examination and restriction of public food handlers or to clean up and screen the hotel kitchen. After three months, barracks and mess hall in the hospital area were ready for the nurses, and no more cases of acute diarrhea or endamebic infection were reported by this group, except for one case of gastro-enteritis.

It was imperative to improve the sanitation immediately, and the following measures were enforced in all U. S. Army installations in the area:

1. For some months after arrival, natives were not allowed to work in mess halls or kitchens or to handle food in the warehouses and bakery, and all except those employed in the laundry were kept out of the camp and hospital reservation. The hospital post exchange did not employ them.

2. Carrier stool examinations of food handlers in hospital messes were done monthly. Two cases of *Giardia lamblia* were thus discovered and treated.

3. The system of rotating kitchen police by roster was discontinued unless weekly physical check-ups were made on them.

4. The officer of the day at the hospital who inspected the mess kits in line required that they be held in clean boiling water before each meal. The hands of food handlers were inspected before serving began.

5. Lysol solution for washing of hands was placed outside the latrines. The pits were burned out at least once a week.

6. Garbage was disposed of by inclined-plane incinerator. Armed guards posted about the incinerator kept out the native scavengers who lined the fenced-in area.

7. During the first week at camp, medical officers lectured briefly to small groups from all units of the command on malaria and dysentery, stressing sanitary and hygienic measures. Rules aimed to prevent the contraction of diarrheal diseases were officially issued and posted.

8. Some four months after camp was established, the hospital took over the supervision of all dispensaries and referred each man with diarrhea to the laboratory for stool examination before confining him to quarters. When pus, red blood cells, and mucus were found, the patient was hospitalized.

9. Walking barefooted in tents or to and from the showers and swimming in rivers and artificial pools were prohibited.

10. The town water supply, considered potable by local sanitary officials, was chlorinated before use.

11. After a few months, cases of diarrhea reporting from the hospital detachment were admitted to the hospital rather than to quarters.

RESULTS

In eight months, there were admitted to hospital 7 cases of dysentery due to *Endamoeba histolytica*, 18 of bacillary dysentery, 7 cases of *Giardia lamblia*sis, 32 of acute enteritis, 26 of gastro-enteritis—a total of 90 cases of diarrheal diseases. Six patients whose stool examinations revealed *Endamoeba coli* and two with *Trichomonas hominis* were hospitalized. These organisms were not considered pathogens. No case of metazoal infestation was seen. In the eight months, sixty-three men were admitted to quarters, after reporting ill with diarrhea, and classed as cases of acute enteritis or gastro-enteritis.

TABLE I
Days lost because of these infections

Month	Admitted to quarters		Admitted to hospital	
	Total days lost	Av. days lost per person	Total days lost	Av. days lost per person
1	29	2	52	4
2	32	2	108	6
3	25	1.8	371*	10
4	21	1.5	116	7
5	7	2.0	22	6
6	—	—	21	7
7	—	—	—	—
8	—	—	19	9

*Cases of endamebic dysentery.

Sixteen of the 18 cases of bacillary dysentery were admitted between the first and fifth months shown in the table. Seven patients gave a history of eating in two or three town restaurants. Three men had eaten only in Army mess halls and had purchased no fruits from native vendors. The average length of hospital stay of this group was ten days. Patients were not discharged unless the stool culture was negative after treatment. Chronic or recurrent cases were not found. Sulfaguanidine was used in treating fourteen patients.

There were nine admissions of 7 cases of *Endamoeba histolytica* colitis. A restaurant was the source of infection in one instance, and the hotel in which the nurses were billeted, in another. A third patient was infected when on detached service. A fourth, a hospital laboratory worker, probably a stool-to-mouth infection, was the only member of the hospital detachment reported ill with this disease. The clinical courses were all relatively smooth. Three patients inadequately treated had recurrences. Three negative stool examinations following treatment were the criteria for discharge. Monthly follow-up stool examinations were done at least twice on all cases.

Had complete bacteriologic studies been possible on all cases of diarrheal diseases, some cases grouped under enteritis, acute, might have been found to be bacillary dysentery. However, admission stool cultures were taken on 22 of the 32 cases of enteritis and no intestinal pathogens were found. The average number of days in hospital was only five. Fourteen of the men admitted with gastro-enteritis remembered a certain meal which preceded, by a few hours, the onset of abdominal cramps, vomiting, and watery diarrhea. Explosive outbursts of such "food poisoning" did not occur in any company mess. Their period of hospitalization was from two to four days.

The results of stool cultures on the cases of bacillary dysentery were:

<i>Shigella paradysenteriae</i> Flexner.....	8 cases
<i>Shigella paradysenteriae</i> Sonne	2 cases
<i>Shigella dysenteriae</i> Shiga	1 case
<i>Shigella dysenteriae</i> Schmitz	5 cases
<i>S.</i> of Flexner and Sonne	1 case
<i>S.</i> of Flexner and Schmitz.....	1 case

COMMENT

The noneffective rate for all diarrheal diseases causing admission to hospital and quarters was highest during the third month. The number of admissions to quarters, per month, was about the same for four months after arrival. The noneffective

TABLE II
Stool examinations, station hospital laboratory

Month	Microscopic examinations		Culture	
	Positive <i>E. histolytica</i>	Negative	Positive <i>Shigella</i>	Negative
1	0	0	4	25
2	4	31	3	28
3	9	134	9	39
4	6	232	9	50
5	0	64	0	6
6	0	42	2	10
7	0	19	0	7
8	0	14	1	7
Total	19	536	28	172

rates for all diarrheal diseases, hospital and quarters cases, during the eight months covered in this study were not a serious disease handicap to a task force. It is our opinion that the non-effective rate calculated from this study and the incidences of endamebic and bacillary dysenteries at this tropical station are significantly low.

CONCLUSIONS

1. Rigorous supervision of sanitation, and publicity, health propaganda, and preventive medicine must be continuous and energetically practiced.

2. Recent U. S. Army directives on the sulfaguanidine therapy of bacillary dysentery and on the treatment of endamebic dysentery outline effective means of curing these diseases.

3. Food handlers in Army messes must be constantly examined. The practice of rotating kitchen police by roster adds potential carriers who must be examined at frequent intervals. Monthly or bimonthly stool examinations and cultures should be made on food handlers, wardmen, nurses, and officers.

4. In all fairly large Army installations, a bacteriologic laboratory is necessary.

5. Each dispensary case of diarrhea should be considered a pathogenic infection, and ruled out as such, before the soldier is sent to quarters or duty. All food handlers with diarrhea should be relieved of cooking and kitchen police duties until proved free of intestinal infection.

6. Much interest should be taken by medical officers admitting cases of diarrhea to discover the source of the infection. Time spent on epidemiologic investigation reduces the incidence of dysentery.

Reconditioning Problem at Oliver General Hospital

LIEUT. COLONEL S. E. BILIK
Medical Corps, Army of the United States

All branches of the military service are stressing the reconditioning of men who are convalescing from illness or injury. Prolonged hospitalization leads to physical and emotional deterioration if nothing is done to combat the boredom, weariness, atony, atrophy, and general debility. A soldier's rehabilitation is not complete until he regains maximum strength, ruggedness, ability to participate in military training, and the spiritual qualities which are called morale.

This new concept of thorough reconditioning of the convalescent is swiftly spreading into civilian medicine. Physical therapy received its great impetus during the last war. Reconditioning bids fair to be the welcome progeny of this war. Medical literature contains little that would serve for guidance. After analyzing suggestions offered by the War Department (WD Memo W40-6-43) and The Surgeon General's Office (Circular Letter No. 168, 21 September 1943; S. G. letter, 10 December 1943) programs were planned reflecting the limitations of available personnel and physical equipment and to an extent the personal preferences of the directing officer.

Rehabilitation is the use of physical therapy, occupational therapy, recreational therapy, and physical training to promote and hasten recovery from illness or injury. Rehabilitation must be considered a phase of therapeutics to be dispensed under the guidance of the patient's physician. Vocational rehabilitation will shortly assume prime importance in the task of restoring war casualties to economic usefulness.

Reconditioning comprises physical and educational training aimed at the attainment of excellent physical and mental condition. The early intent to limit efforts in reconditioning to convalescents capable of being restored to duty has been broadened to include all convalescents regardless of their ultimate disposition.

Oliver General Hospital at Augusta, Georgia, consists of a main building (formerly the luxurious Forest Hills Hotel) and more than 100 semipermanent tile-brick structures. The initial contingent of 125 patients arrived in January 1943, and by February the development of a reconditioning program was under way. Having had experience in training and conditioning athletes, I approached the task with a profound appreciation of the vastness of a plan aimed to provide daily physical and educational activities for all patients in an 1,800-bed hospital, except those whose illness contraindicated activity.



FIGURE 1. Patients in hospital room construct model airplanes. Planes they have constructed hang from ceiling.

The commanding officer and the entire staff cooperated. Intermittently we indulged in publicity to keep the staff informed, repeatedly stressing that "All medical officers attached to Oliver General Hospital must recognize the emphasis laid on reconditioning by the War Department, The Surgeon General, and our commanding officer and cooperate wholeheartedly in promoting the program."

Photographs by U. S. Army Signal Corps.

Our reconditioning program aims to include all patients grouped as follows:

- CLASS 1. Fully recovered convalescents able to participate in grueling exercise.
- CLASS 2. Fully recovered convalescents requiring intelligently graded training to prepare for progression to Class 1.
- CLASS 3. Ambulant ward patients, handicapped to varying degrees by the residue of their injury or illness.
- CLASS 4. Bedridden patients or those able to get around the ward only with considerable difficulty.

With these classifications in mind, three distinct programs were set up: (1) reconditioning of Class 1 and Class 2 patients; (2) reconditioning of ward patients; (3) reconditioning of officer patients.

RECONDITIONING OF CLASS 1 AND CLASS 2 CONVALESCENTS

The Reconditioning Center consists of six enlisted men's barracks (cantonment type HB-63) with a capacity of 76 men each. The barracks are adjacent to the wards and are connected to them by a catwalk about 150 feet long. The Center thus forms a relatively separate unit.

Plant and equipment. We have a completely equipped athletic field suitable for drilling, conditioning exercises, and competitive sports—hardball and softball diamonds with bleachers, volleyball, badminton, tennis, handball, and basketball courts. An adjoining field is equipped with 60 tables suitable for sun bathing and for abdominal and back exercises. Skirting this field is a modified obstacle course and a variety of "homemade" apparatus—climbing stairs, hand rail walker, punching dummies, targets, flying rings, climbing ropes, back developer, horizontal bars—providing means for special exercise of weakened parts. Nearly all the equipment on both fields was constructed by our convalescents out of salvaged materials left by the contractors after completion of the hospital buildings.

While the hospital boasts of the famous Forest Hills golf course, golf is not considered a conditioning exercise for Class 1 and Class 2 convalescents but rather as a means of recreation. Since the reconditioning program covers every hour of the day, golf is limited to patients unable to participate in more strenuous activities.

A standard-size gymnasium is under construction. Minor sports—putting, horseshoe pitching, croquet, shuffleboard, and ping-pong—are available for patients for whom more rigorous exercise is contraindicated and also for recreation. An ample variety of athletic equipment purchased by the hospital fund is available.

Personnel. While the Reconditioning Center is under the supervision of the commanding officer, the actual conduct of the program is the responsibility of the reconditioning officer, who should have a sound concept of the physiology of exercise and of the principles of physical training, a deep conviction of the value of rugged health, and the energy and perseverance to promote his program in the face of disheartening handicaps. The best formed plans can be nullified by indifferent promotion or direction.

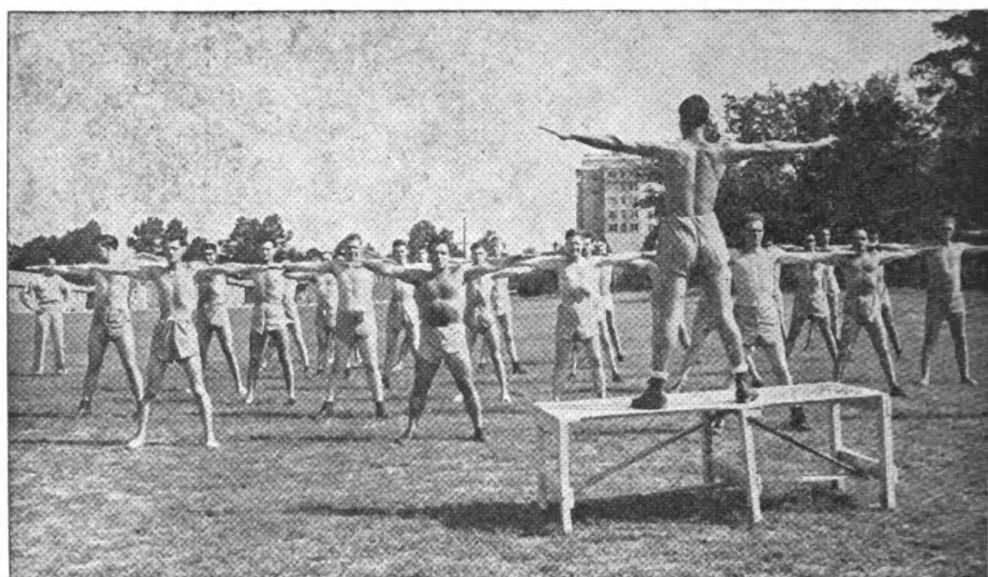


FIGURE 2. Patients exercising under leadership of drill master.

Assisting the reconditioning officer are two officers of the Medical Administrative Corps and another is to be assigned to the Center shortly. One serves as the administrative officer, the other as the educational (morale) officer. The former is assisted by a sergeant and six enlisted men, the whole unit functioning as a subdivision of the detachment of patients. The administrative officer takes care of the various administrative problems incidental to the housing and supervision of from 250 to 460 trainees. Not the least of these problems

is that of discipline. The convalescent admitted to the Center is treated as a line soldier with all his privileges and restrictions. Failure to enforce disciplinary measures, promptly and firmly, brings rapid falling off in attendance, lateness, half-hearted efforts, lack of cooperation, and deliberate breaking of rules. When the Center was started, it was found necessary to be strict. The trainees learned that failure to abide by regulations led to denial of passes, restrictions, and even confinement to the detention ward. Consequently disciplinary problems have grown far fewer. A strong, capable personality in the administrative officer is highly desirable.

The work of the educational officer is to provide capable, interesting lecturers on military subjects and current events, to obtain training films, and to procure speakers on actual war experiences from among the oversea casualties. Here, too, it is vital to have an officer who appreciates the importance of his duties; one who will strive earnestly to provide material which will advance the primary purpose of the educational program—the development of service morale. The recreational phase of our program has been left to the Red Cross, which has been wholly adequate in this respect.

Our physical training staff consists of six noncommissioned officers, two of whom are graduates in physical education. One of the latter, with a master's degree, serves as field supervisor of activities, directing, advising, and observing. His observations are of importance in the weekly evaluation of the trainee's fitness to progress to a more intensified program or to be returned to duty. The importance of using qualified physical educators in this work cannot be overemphasized. It is inadvisable to select as instructors men whose only qualification is an impressive athletic record. Such men, if interested and conscientious, should receive sufficient indoctrination to prepare them for the work. The four noncommissioned officers of our group who lack the desirable professional qualifications, have made up for it, to a degree, by a sincerity of purpose and a willingness to be taught. It may be advisable to employ civilian physical directors. Many physical educators, past the draft age, are eager to lend a hand. Reconditioning seems to be an ideal field for them.

The trainee. The convalescent is sent to the Reconditioning Center with his chart, the transfer slip, and form RC100 (an arbitrary designation):

RECONDITIONING CENTER
OLIVER GENERAL HOSPITAL

NameGrade.....Ward.....Service.....

Diagnosis

Class 1. Able to participate in rigorous unlimited training.

Class 2A. Graduated training; also in need of special exercises for local disability.

Indicate nature of latter

Suggestions and precautions

..... M.C.
Ward Officer

RECONDITIONING PROGRESS NOTES

V V

When training is completed, a progress note is typed on the Final Summary page (back of 55D) summarizing our observations and conclusions. In addition a brief report is attached to the soldier's Service Record informing his commanding officer of the nature of the disability, the course and extent of recovery, that the soldier has completed the reconditioning program including a 15-mile hike, and of our conclusions as to the man's fitness to resume full field duty. We comment on the soldier's conduct and morale during his stay at the Center. The summary acquaints the commanding officer with the exact condition of the patient and his mental attitude toward the service and thus may prevent, if possible, any inclination on the part of the soldier to resume the cycle

of persistent sick calls and demands for rehospitalization. At the Center the trainee is assigned to a specific barracks; all orthopedic cases to barracks C1; all surgical cases to barracks C2; the CDD prospects to C6, farthest away. This grouping eases the task of medical re-examinations.

The trainees are issued fatigue uniforms, returnable when leaving the hospital. Many patients reach the hospital with little clothing, often lacking shirts, socks, and shoes. This, as a rule, is not discovered until the convalescent reaches the Center and results in some delay in starting field training. The "fatigues" are worn throughout the day. During the summer, the trainees are supplied with khaki shorts, thus assuring plenty of sun bathing during exercise hours. After dinner the trainees change into olive drabs.

Inspection of the barracks is held frequently, and orderliness and cleanliness are enforced. Soldiers temporarily excused from training are assigned to barracks or hospital fatigue duties. It is necessary to watch carefully for abuse of such assignments. The various departments of the hospital, manned by limited personnel, eagerly seek additional help. However, the primary aim of the reconditioning program is to toughen the convalescent for duty as quickly as possible. Time taken in performing fatigue assignments prolongs hospitalization and clogs the flow of patients to and through the hospital. Therefore, fatigue duties are limited to trainees who are unable to participate in the field program. We try to have clinic appointments, physical therapy, pay roll signing and dispensing, and re-examinations conducted during hours which do not interfere with the trainee's continuous participation in the reconditioning schedule.

An average of eighteen to twenty-one days appears sufficient for the reconditioning of most convalescents. Where a soldier's stay at the Center is unduly prolonged, there is a noticeable lowering of his application, cooperation, and morale.

The program. The Master Schedule gives a complete picture of our routine at the Center. This schedule is adhered to conscientiously. Slipshod or perfunctory efforts are not permitted. There is a plan and a definite progression of intensity of training to the desired peak. Every effort is made to create interest and to move the program along briskly. Roll call is taken before and after classes. Absentees are reported to the administrative officer and the reconditioning officer.

Relatively few trainees participate in the program with the desired vim and interest. The reaction of trainees to our program varies. A few claim that the latter is not strenuous enough (air-borne troops are the chief complainants in this respect). The majority say that the training routine is too rigorous, more so than in their own units. After a few days in the field, many plead that they are in excellent physical condition and are eager to return to duty immediately, when it is apparent they are merely eager to escape the daily grind. We feel confident that the program is well within the tolerance of the trainees.

Our field instructors are warned to heed complaints. If a trainee claims that he cannot do the exercises or that they aggravate his condition or that he has developed new symptoms, he is immediately sent to see the reconditioning officer, who examines him to determine if there is a basis for complaint. If in doubt, I may consult his referring service. The training is continued, modified, or discontinued in accordance with the findings. While many field complaints are baseless, there are also numerous justifiable complaints.

In promoting interest in the reconditioning service among the staff, we repeatedly stress the desirability of sending to the Center all patients with minor disabilities which do not require ward care. For example, a patient recovering from a fracture or a burn or a laceration of a finger or a hand, may well be referred to the Center where he can undergo progressive reconditioning even while the rehabilitation is being completed. About 25 percent of our trainees are still receiving physical therapy, occupational therapy, and drug therapy daily. When Generals F. W. Rankin, H. J. Morgan, and R. W. Bliss visited the hospital, this point was emphasized by presenting a patient who had been treated for months with radiant heat, ultraviolet, massage, and stretching exercises to soften extensive postburn scars of the shoulder and arm. During the months of treatment, the soldier was a trainee at the Center participating in all of its activities. When his local disability attained maximum improvement, we were able to send him back to duty in excellent physical condition. This soldier's hospitalization was greatly shortened by simultaneous use of rehabilitative and reconditioning measures. The assignment of such convalescents to the Center is logical and fair. Failure to move these ambulant cases to the Center ties up beds needed on the wards. Similarly the early transfer of

RECONDITIONING CENTER MASTER PROGRAM

Monday			Tuesday			Wednesday			Thursday			Friday			Saturday				
Class	1	2	Special exercise	1	2	Special exercise	1	2	Special exercise	1	2	Special exercise	1	2	Special exercise	1	2	Special exercise	
5:45-6:15	Reveille and roll call			Reveille and roll call			Reveille and roll call			Reveille and roll call			Reveille and roll call			Reveille and roll call			
6:25-7:00	Barracks fatigue			Barracks fatigue			Barracks fatigue			Barracks fatigue			Barracks fatigue			Barracks fatigue			
8:00-9:00	Sick call—P.T.			Sick call—P.T.			Sick call—P.T.			Sick call—P.T.			Sick call—P.T.			Sick call—P.T.			
9:00-9:40	Hike 5 miles	Calis-thenics	Calis-thenics	Calis-thenics	Calis-thenics	Calis-thenics	Hike 5 miles	Calis-thenics	Calis-thenics	Calis-thenics	Calis-thenics	Calis-thenics	Hike 5 miles	Calis-thenics	Calis-thenics	Inspection — re-examination			
9:40-10:20		Hike 2½ miles	Hike — mod.	Drilling	Drilling	Drilling		Hike 3 miles	Hike — mod.	Drilling	Drilling	Drilling		Hike — mod.	Calis-thenics				Calis-thenics
10:20-11:00		Athletics	Athletics	Athletics	Drilling—special exercise	Athletics		Athletics	Athletics	Athletics	Athletics	Athletics		Athletics	Athletics				Athletics
11:00-11:40	Lecture			Lecture			Lecture			Lecture			Lecture						
12:00-1:00													15						
1:10-2:00	Current events			Current events			Current events			Current events			Current events			Current events			
2:00-2:40	Calis-thenics obstacle course	Calis-thenics	Special exercises	Calis-thenics obstacle course	Calis-thenics	Special exercises	Calis-thenics	Calis-thenics	Special exercises	Calis-thenics obstacle course	Calis-thenics	Special exercises	Calis-thenics obstacle course	Calis-thenics	Special exercises	Calis-thenics obstacle course	Calis-thenics	Special exercises	
2:50-3:30	Athletics	Athletics	Athletics	Athletics	Athletics	Athletics	Athletics	Athletics	Athletics	Athletics	Athletics	Athletics	Athletics	Athletics	Athletics	Athletics	Athletics	Athletics	
3:40-4:20	Training film			Training film			Training film			Training film			Training film			Training film			
4:30—	Dinner			Dinner			Dinner			Dinner			Dinner			Dinner			
	Recreation—Red Cross			Recreation—Red Cross			Recreation—Red Cross			Recreation—Red Cross			Recreation—Red Cross			Recreation—Red Cross			

CDD prospects to the CDD barracks just as soon as the decision is reached that the soldier is unsuitable for military duty has been urged.

The proposal that reconditioning centers be wholly separated from the hospitals is highly meritorious. Observation of over 2,000 trainees assigned to our Center leads to the conviction that the sooner the Class 1 and Class 2 convalescents are removed from the softening atmosphere of luxurious general hospitals, and the sooner they are placed in military environment, the more rapid and the more complete will be their reorientation into combat soldiers. The hospital atmosphere is conducive to the development of an endless chain of symptoms, exaggerations of minor complaints, and constant requests for consultations with "specialists."

The reconditioning centers may well be located at military posts and be conducted as military units with medical supervision. If this arrangement is effected, the station and general hospitals can continue using their present reconditioning organizations and plants as convalescent or pre-conditioning centers where rehabilitation is combined with graded reconditioning of the more advanced Class 3 patients. The steady flow of the latter to the center would effectively open up numerous additional beds on the wards and incidentally greatly speed the task of reconditioning.

RECONDITIONING OF WARD PATIENTS

When a college football player is disabled, his trainer immediately concentrates on means of preventing, as far as possible, loss of conditioning. Whether the patient is bedridden or ambulant, physical therapy and physical training are used intensively throughout the day—within the patient's tolerance. The reconditioning efforts within the wards of service hospitals may well follow a similar intensive pattern, starting at bedside the moment the ward officer approves.

Our efforts in this direction were launched by means of the following appeal to the medical staff:

"The Reconditioning Center caring for convalescents is functioning smoothly. We are now ready to proceed with the organization of a reconditioning program for the ward patients The Reconditioning Service aims to take care of every patient provided there is no contraindication to physical exercise within the patient's tolerance. To make this phase of our program effective, we need your enthusiastic cooperation. Please consider reconditioning an indispensable form of therapeuticsThe at-

tached blank should be filled out and forwarded at the earliest opportunity after the patient's workup is completed . . . In general the A and B groups will be taken off the wards for exercise at 9 a. m. and 2 p. m. The C and D groups will receive exercise on the wards."

R105

**RECONDITIONING CENTER
OLIVER GENERAL HOSPITAL**

Date.....

NameGrade.....Ward.....Service.....

Diagnosis

Group classification, check

Group A. Ambulant. Able to participate in strenuous activities.

Group B. Ambulant but handicapped. Indicate nature of latter

.....

Group C. Ambulant, but with considerable difficulty.

Group D. Bed patient.

Your suggestions or instructions

..... M.C.

Ward Officer

RECONDITIONING PROGRESS NOTES

Organization. The supervision of this phase of the reconditioning program is the responsibility of the chiefs of the respective services, while the actual direction of the physical and educational activities is the duty of the reconditioning officer. This is the setup at Oliver General Hospital. Working under my guidance are physical directors, each assigned a number of wards totalling 100 to 110 active beds. A two-page mimeographed leaflet seeks to obtain the cooperation of the ward patient:

To ward patients

Your stay at Oliver General Hospital will result in (1) return to full duty, (2) return to limited duty, or (3) discharge from the Army.

Whatever it be, it is certain that prolonged hospitalization with inactivity and weariness will lead to mental and physical deterioration. To avoid this and to assure that when you leave here you will be in the best possible condition, Oliver General Hospital conducts a special Reconditioning Service.

Each patient is placed in one of the following groups:

(1) those who may participate in strenuous exercise and sports;

(2) those whose exercise must be graduated; (3) those who get around the ward with difficulty; (4) those who must stay in bed.

The hospital has planned physical training for each group. A qualified physical director will receive your name from the ward officer and will supervise your training.

Whatever your injury or ailment, good health and activity which stimulate the blood circulation and improve the appetite will hasten your recovery. And reversely, a sluggish blood stream in a flabby body will hinder and slow healing. It is our and YOUR task to prevent the latter and keep you in as good condition as possible.

Take regular exercises three to four times daily whether you are still bedridden or are able to get around. Take the exercises moderately at first, then gradually increase the number and the intensity of the exercises until you are getting a vigorous workout. Consult the physical director who visits your ward to guide you.

Of the exercises described below, certain ones have been checked as most suitable for your needs. If they are not clear, ask the physical director to demonstrate them.

There follow illustrations and descriptions of fifteen exercises suitable for conditioning the whole body. This appeal to reason will not induce many patients to exercise regularly on their own. The only way to assure that instructions are carried out is to have the exercises performed in the presence of the physical director. Whether conditioning exercises are to be conducted in classes or individually depends on the composition of the ward. If there is great variation in the nature of the disabilities and in the stages of recovery, as for example in a postoperative orthopedic ward, group instruction is out of the question. The latter, however, is preferable where there is some uniformity in the types of cases, i. e., in a "knee" ward or in a "shoulder" ward. The enormity of the task is apparent when one stops to consider that in a hospital of 1,800 beds, an average of 1,200 patients are candidates for supervised daily reconditioning.

Groups A and B of the ward cases are taken outdoors for their exercise when the weather is clear and sufficiently warm. The gymnasium will be of aid in this respect. The physical training is balanced with an educational program similar to that provided for the Reconditioning Center trainees. Spontaneous interest in exercise can be induced on the wards by providing modified gymnastic apparatus, such as a stationary bicycle, pulley weights, a rowing machine, and stall bars.

Our reconditioning program on the wards (for Classes 3 and 4) is not as advanced, at this stage, as is our Reconditioning Center (for Classes 1 and 2), primarily because we have concentrated on the latter and because sufficient personnel has not been available to broaden the "in" program. However, we are now conditioning hundreds of patients daily and expect to be able soon to take care of all.

RECONDITIONING OF OFFICER PATIENTS

This phase of the program is wholly voluntary as will be indicated by the extracts¹ from our mimeographed pamphlet for officer patients. We have had the desired cooperation from the officer patients.

CONCLUSION

The reconditioning of hundreds of patients is a vast and complex task. It requires tenacious perseverance and profound belief in the cause to achieve the desired results.

The Neuropsychiatrist and Convalescent Training Program of Army Air Forces

MAJOR ALBERT A. ROSNER

Medical Corps, Army of the United States

The establishment of a training program for convalescent patients in A. A. F. hospitals is provided for in Memorandum No. 25-9, War Department, Headquarters Army Air Forces. An A. A. F. letter, dated 10 March 1943, announced that the operation of this program "definitely decreased morbidity and hospital readmission and increased the effectiveness of soldiers returning to duty." It was stated in addition that the patient's response to the program was excellent and that morale was greatly benefited. Upon the assumption that morale and mental hygiene are largely synonymous, an attempt was made to combine the activities of the mental hygiene department of the station hospital, Dale Mabry Field, Florida, with that of the more general problem of convalescent and postconvalescent morale.

1. Because of lack of space, these extracts have been omitted from *The Bulletin*. They will appear in the reprints.

The psychiatrist's place in questions of wartime morale, both civilian and military, has received a great deal of attention recently.^{1 to 11 incl.} The maintenance of a normal balance between thinking and feeling is a psychiatric problem that applies to many as it does to one, and to the whole Army as well as to any of its components. Understanding of these facts is reflected in the establishment by The Surgeon General's Office of mental hygiene units in replacement training centers.^{1 2} The detachment of patients at the station hospital was regarded as an additional Army component that warranted this particular brand of psychiatric attention.

A recreation and reconditioning program for convalescent soldiers is understandably a part of the more general problem of morale. More to the point, it appears to fall within the scope and province of mental hygiene. A poorly conditioned soldier upon discharge from the hospital is no credit to his organization or the Army and is likely to be a distinct liability. Conditioning is no less a mental than a physical affair. A neuropsychiatrist cannot dissociate himself from the problem of convalescence; aside from the issue of morale, that psychosomatic complex—the healing human body—invites active neuropsychiatric attention, if not intervention. On these premises, the neuropsychiatrist at the station hospital assumed responsibility for the organization and inauguration of the convalescent training program.

The mental hygiene department at Dale Mabry Field evolved as a natural outgrowth of the neuropsychiatric section of the station hospital, serving first as a follow-up clinic and later, as the need arose, as a self-sustaining department. Though the number of patients was small, the operation of the department has reduced the admission rate of the neuropsych-

1. Stilwell, L. E., and Schreiber, J.: Neuropsychiatric Program for a Replacement Training Center. *War Medicine*, 3:20, January 1943.

2. Neuropsychiatry in the Army (Editorial), *J. A. M. A.*, 121:1154, 3 April 1943.

3. Strecker, E. A., and Appel, K.: Morale, *Am. J. Psychiat.*, 99:159-163, September 1942.

4. Gillespie, R. D.: Psychological Effects of War. New York: W. W. Norton and Company, 1942. (The Salmon Lectures)

5. Sullivan, H. S.: Psychiatry, the Army and the War, *Psychiatry*, 5:435, August 1942.

6. Bowman, Karl M.: War Neuroses, *N. York State J. M.*, 42:1729, September 1942.

7. The Neurosis in War, Ed. by Emanuel Miller. New York: The Macmillan Company, 1940.

8. Blakeslee, G. A.: Neuropsychiatry in War Time, *Bull. N. York Acad. M.*, 18:775, December 1942.

9. Porter, W. C.: Functions of a Neuropsychiatrist in an Army General Hospital, *Psychiatry*, 5:321, August 1942.

10. Porter, W. C.: Military Neuropsychiatry, *War Medicine*, 2:543, July 1942.

11. Porter, W. C.: Psychiatry and National Defense, *Pa. Mental Hygiene Bull.*, 19:18, January 1942 (cited).

chiatric section and has permitted use of hospital beds for other purposes. As far as possible, cases of psychoneurosis, neurocirculatory asthenia, and constitutional psychopathic state, as well as examination of prisoners, were handled by the mental hygiene department. Treatment followed the generally accepted principles concerning the operation of psychiatric outpatient departments. Included were the usual psychotherapeutic methods of discussion, analysis, and suggestion. The patient was encouraged to seek and to participate in activities designed as abreactive agents. He was encouraged to express himself, his personality, interests, and feelings in a designed program of planned and supervised activity. In this respect the principles followed were those advocated by Adolph Meyer. This phase of the program was particularly difficult to execute under Army conditions and never advanced beyond a fairly primitive stage of development. The recreation and reconditioning program afforded the mental hygiene department an opportunity to expand its efforts in this direction and provided a means of solving this problem.

An interesting reciprocal relationship was established between the program of the mental hygiene department and that of the convalescent program. Mental hygiene department patients participated directly in the daily schedule as an abreactive psychotherapeutic measure. They presented talks, were expected to participate in debates, perform, and otherwise were encouraged to display and dramatize their interests and talents. For example, one psychoneurotic outpatient conducted religious discussions with a small picked group, while another conducted a small class for illiterates. Another supervised a book review seminar. In these patients it was anticipated that the convalescent training program would become a point of focal interest and would provide a useful therapeutic measure for themselves and for the group as a whole. From the point of view of group psychotherapy, the possibilities of this system are obvious.

On the theory that the average hard-working soldier at a military installation is surprisingly unaware of what his neighbor is doing, a program was designed which was intended to illustrate the principle of cooperative living. The Army community in which the patient is stationed was used to show that living together consists of many people attending many jobs. Patients were brought into contact with these jobs and the

people who performed them. For example, one group was taken, by the base sanitation engineer, on a tour of inspection of the water purification and sewage disposal plants, an outing that provided as much in the way of exercise as it did of interesting and useful information. A system of local tours of this character was expected to provide the soldier-patient an opportunity to see the things he has heard about. He saw what an Allison engine looks like, how it was serviced, how a Link trainer operated, how engineers built bridges, how maintenance shops operated; he learned who the meteorologist was and what he did. Base S 3 made available many facilities and promised full cooperation in these daily tours to stations of local educational interest.

The educational schedule cut a wide cultural pattern. The services of the public relations officer were drafted to effect a closer relationship between this part of the program and the cultural life of the surrounding community. The local city newspaper and radio station, as a consequence, were of inestimable value in recruiting a wide variety of outside talent. Members of the faculty and student body of the nearby Florida State College for Women cooperated in offering their services, and addresses by members of the faculty were an integral part of the program. Similarly, through the intercession of the local Red Cross field director, social organizations of the City of Tallahassee were tapped for talent. Officer personnel of the base were cooperative. Talks by fliers recently returned from combat duty were arranged.

It was anticipated that soldier talent among the detachment of patients would be exploited to the limit and, as far as possible, patients with special interests and capabilities were to be called upon to participate in their own program. Daily radio and press releases delivered through the base public relations officer provided the substance of tri-weekly news reviews, delivered by a member of the group. Base S 2 supplied maps and charts and provided speakers from time to time on matters of special military interest. A class historian recorded the progress of the program, the daily schedule, and the substance of each speaker's remarks. These were incorporated in the Recreation and Reconditioning Log.

Physical education and rehabilitation was supervised by the base athletic director under the direction of the recreation and reconditioning officer. Through the cooperation of the

base special services officer and the education and classification officer, all available training and educational films, short subjects and full features, were made available for use. These features of the program conform to the directions of A. A. F. Memorandum No. 25-9.

The recreation and reconditioning program at Dale Mabry Field was considered as an experiment in mental hygiene. Still in its earliest developmental stages, its full value was still to be demonstrated. Nevertheless, it provided the neuropsychiatrist an interesting and provocative method of approach to the vital question of military morale. If nothing else the recreation and reconditioning program affords the military neuropsychiatrist an opportunity to provide from his own experience a full measure of useful advice and aid in the execution of what is certainly a necessary innovation in station hospitals.

Sulfathiazole for the Prevention of Gonorrhea

MAJOR PAUL G. REQUE

Medical Corps, Army of the United States
and

LIEUT. COLONEL DANIEL BERGSMA

Medical Corps, Army of the United States

The effectiveness of sulfathiazole in preventing gonorrhea has been shown in previous reports.^{1 2} The present report confirms this finding as applied to Army field forces under conditions of military training and alert status activity.

PROCEDURE

A single dose of 3 grams of sulfathiazole was given on request of the individual soldier during the first two hours after sex exposure, and routinely after the second hour. No further sulfathiazole was given. The drug was dispensed by noncommissioned officers, by attendants at prophylactic stations, or by designated members of the Medical Department at dispensaries. The persons dispensing the sulfathiazole were instructed to see that each soldier actually swallowed it together with a full glass of water. Sulfathiazole was not given

1. Arthur, R. D., and Dermon, H.: Sulfathiazole as a Venereal Disease Prophylaxis, *Amer. J. Syph.*, 27:261-266, May 1943.

2. Loveless, J. A., and Denton, W.: The Oral Use of Sulfathiazole as a Prophylaxis for Gonorrhea, *J.A.M.A.*, 121:827-828, 13 March 1943.

if a history of drug sensitivity was known, and it was not given more than twice in one week.

The soldier's initials were recorded together with the period of time that elapsed between taking sulfathiazole and sex contact and whether or not any other prophylactic had been used. Two checkups, once each week for two weeks, and a physical inspection were made to determine the presence of gonorrhea, and questions were asked concerning reactions occurring during the period. Apparently many of the reactions to the drug were so mild they were not reported before the first routine checkup on the seventh postprophylactic day. The drug was eventually given to all asking for it within the two-hour limit and routinely after the second hour. If a soldier came for the drug within two hours of sex contact, he was urged to use the entire routine chemical prophylaxis available, as the latter offered protection against other venereal disease and not gonorrhea alone. This information was stressed in sex-hygiene lectures given the men. Sulfathiazole was not given to aviators, because of possible disturbance of vision and labyrinthine function, nor to persons with a record of sensitivity to sulfonamides.

RESULTS

A total of 5,037 individual doses of 3 grams of sulfathiazole was given (table I). In 3,555 instances some other antigonococcal prophylactic had been used in addition to sulfathiazole. In 1,482 individuals, sulfathiazole was the sole prophylactic used against gonorrhea and in this group there was one failure. Among the 3,555 who used sulfathiazole plus additional prophylaxis, there were two failures. The percent of failures in the two groups was 0.07 and 0.06 respectively.

REACTIONS

The term "reaction" is unfortunate as it generally designates some serious ill effect or toxic response. The term "side effects" perhaps would be preferable, as it more truly characterizes most of the ill effects recorded in this study.

TABLE I
Prophylactic measures used

Prophylactic used	Number of cases	Number of failures	Percent of failures
Sulfathiazole only	1,482	1	0.07
Sulfathiazole plus additional prophylaxis	3,555	2	0.06
Totals	5,037	3	0.06

Of 5,037 three-gram doses of sulfathiazole given, 191 or 3.8 percent were followed by recorded reactions (table II), none of which was serious or incapacitating except for periods less than twenty-four hours. Nearly all of the reactions were discovered on questioning during the weekly checkup, the individuals not considering them worth reporting when they occurred. Severe nausea, once with vomiting, was present in four instances, continuing in two cases about twenty-four hours. Although no other ill effects required relief from duty, some justified lighter work for the individual.

The percent of reactions was 3.8, or slightly higher than the "severe reactions" (1.1 percent) previously reported.³ While none of the reactions in our study was "severe," of particular interest is the number reporting "dizziness," which was not a prominent symptom in previously reported evaluations of sulfathiazole. However, most of the previous reports had to do with bed patients, whereas in this study all were ambulatory and very active physically. Dizziness is of extreme importance to military men, particularly flying personnel, airplane spotters, operators of direction-finding equipment, and many others. Reports indicating interference with depth perception comprise another reason to deny flying personnel sulfathiazole as a preventive against gonorrhea. In this study "dizziness" alone or in combination accounted for 61 percent of all the recorded ill effects, and it occurred in 2.3 percent

of all who received the drug.

Nausea, alone or in combination, accounted for 50 percent of all the recorded ill effects, occurring in 1.9 percent of all who received the drug. Nausea and dizziness, either alone or in combination, accounted for 96.3 percent of all recorded ill effects, occurring in 3.6 percent of all who received the drug. While the persistence

TABLE II

*Reactions to a 3 gm. dose of sulfathiazole**

Type of reaction	Number of cases	Percent of total reactions
Dizziness only	88	46
Nausea, only, slight to moderate	64	34
Nausea, only, severe	4	2
Nausea and dizziness combined	28	15
Headache only	4	2
Numbness, only, of lips and tongue	2	1.0
Sweating only	1	0.5
Totals	191	100.5

*5,037 three-gram doses of sulfathiazole were given. Only 3.8 percent of the total had any reaction.

3. Rapid Appraisal of Sulfonamide Drugs in the Treatment of Gonorrhea in the Male, Vener. Dis. Inform., 24:214, July 1943.

of these symptoms could seriously hinder military operations, the single-dose method of administering the prophylactic limits the duration of the symptoms.

Headache was recorded only four times, and none of these cases was severe. This suggests that alcoholism did not significantly affect our results. Two instances of numbness and tingling of the tongue and lips are noted, both occurring in the same unit.

INTERVAL BETWEEN EXPOSURE AND TAKING SULFATHIAZOLE

Some organizations recorded the time interval to the nearest half-hour as requested, and others recorded it as "within two

TABLE III
*Interval between exposure and
sulfa prophylaxis*

Time interval	Number	Percent	Failures
0 to 12 hours	1,399	94.4	1
12 to 24 hours	72	4.8	0
24 to 72 hours	11	.8	0
Totals	1,482	100.0	1

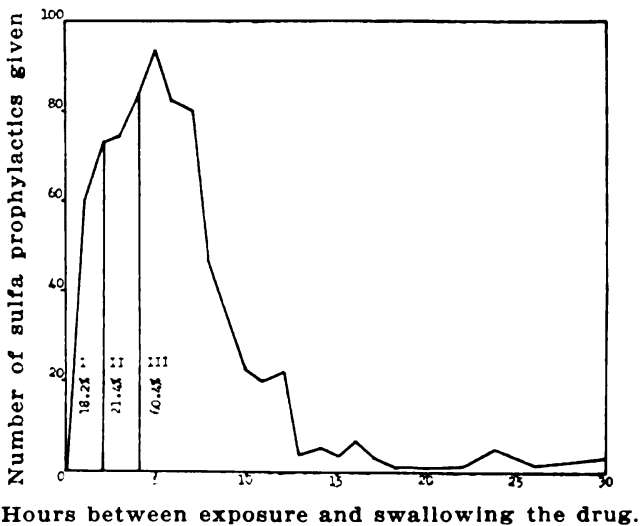
3,555 other doses of sulfathiazole were given, but in those cases other antigonococcal measures were also used (see also table I).

addition to sulfathiazole, regardless of the time interval between exposure and prophylaxis, could not be considered free of infection solely because of the sulfathiazole, although in certain instances that may be so. Accordingly, table III and chart 1 show those soldiers who had intercourse and used sulfa prophylaxis only. Table III shows the total number of soldiers using sulfa prophylaxis only by each twelve-hour interval. Of the total, 732 are shown in chart 1 by hourly intervals. The average number of cases in each hourly time group is 24.1;

hours," "within twelve hours," etc. Accordingly, data concerning the time interval between sex exposure and sulfa prophylaxis are presented in table III and chart 1.

Soldiers who used mechanical or intra-urethral medication in

CHART 1
*Frequency distribution by time interval
between exposure and sulfa prophylaxis*



the range is from 1 to 94. The standard deviation is 31.79. Of the total prophylactics given with sulfathiazole alone, 94.4 percent received the drug within twelve hours of sexual exposure (table III). The number of cases in this group is considered sufficient to indicate the time value of the procedure when used within twelve hours of exposure.

EFFECTIVENESS OF SULFATHIAZOLE

It is impossible to say how many cases of gonorrhea were prevented by sulfathiazole in 1,482 instances recorded in table III. Certainly not all exposures would have resulted in gonorrhea had the "Pro-Pills" been eliminated. The venereal disease incidence rate among the totally unprotected, random, nonmarital exposures is unknown for any area or for any race.

Only 133 or 18.2 percent of the soldiers indicated in chart 1 took sulfa prophylaxis within the two hours after exposure, or within the reasonably effective time of routine station chemical prophylaxis. The 18.2 percent were persons who requested the "Pro-Pills" in preference to protargol. It is possible that had sulfathiazole prophylaxis not been available many of this group might not have come to the prophylactic station at all.

It was not possible to determine the effective time limits of sulfa prophylaxis; apparently it is satisfactory at least up to twelve hours after exposure, which is a marked improvement over the limits imposed by previous methods of gonorrhea prophylaxis. Walker⁴ reported that in the American Expeditionary Forces of World War I there were 0.9 percent failures in one hour, 2.0 percent failures in two hours, and a fairly constant rate of 4 percent failures after four hours, when the station chemical prophylaxis was used. Gonorrhea, then as now, represented the most commonly acquired venereal disease. The civilian gonorrhea prevalence rates in southwestern Europe in 1917-19 or presently along the eastern seaboard of the United States are not known. It is unlikely, however, that the former was over twenty times the latter. Therefore, sulfa prophylaxis must account in part for the low infection rate in this group.

Sulfa prophylaxis can be integrated into a program not only to bring additional persons to the station for preventive treat-

4. Walker, George: *Venereal Diseases in the A.E.F.*, p. 34. Baltimore, Maryland: Medical Standard Book Co., 1922.

ment but also to protect persons who arrive too late for effective prophylaxis from routine intra-urethral medication. Sulfa prophylaxis can be used the morning following a night out with perhaps repeated sex contacts.

FAILURES

The three failures in 5,037 doses of sulfathiazole give a rate of 0.06 percent. One of these occurred among the 1,482 instances when sulfa prophylaxis only was used, a failure rate of 0.07 percent. This soldier, who stated that he took the drug three hours after contact, was found to have an acute urethritis within twenty-four hours of taking the drug, which fact suggests that he used the drug after the wrong exposure. This failure was charged against the group using sulfa prophylaxis only.

The other two failures were in men who stated they had used the drug, the condom, and the chemical prophylactic packet, which, if true, indicates that it takes a lot to protect some individuals. The latter two men had been on furlough and both cases of urethritis were discovered at weekly physical inspections. These two were also reported as failures in table III.

COMMENT

Sulfa prophylaxis is practical in field troops. It is our impression that most of the undesirable side effects would disappear by lowering the single dose of sulfathiazole to 2 grams, or by substituting sulfadiazine.⁵ Sulfa prophylaxis does not protect against syphilis but is probably partially effective in preventing chancroid and lymphogranuloma venereum. A condom and soap and water are valuable against syphilis. All men coming to the prophylactic station within two hours of contact should be advised to take routine chemical prophylaxis, alone or in combination with sulfa prophylaxis. Since it is difficult to persuade soldiers to go to stations for chemical prophylaxis, it is desirable to require all men on pass or furlough to report on return to unit dispensaries, or to designated personnel, that preventive measures may be used as soon as possible.

Sulfonamide drugs are potentially dangerous and a careful check is needed to prevent their indiscriminate use.

5. Kuhns, D. M., Nelson, C. T., Feldman, H. A., and Kuhn, L. R.: The Prophylactic Value of Sulfadiazine in the Control of Meningococcal Meningitis, J. A. M. A., 123:335-339, 9 October 1943.

Preparation of Culture Media in the Field

LIEUT. COLONEL MAX LEVINE

Sanitary Corps, Army of the United States

and

CAPTAIN A. H. STOCK

Medical Corps, Army of the United States

Few bacteria grow on native proteins, and from the early days of bacteriology it has been necessary to supplement such a basic substrate as meat infusion with protein digests. Witte's peptone was for a long time considered indispensable for preparation of culture media. In the past two decades a number of tryptic and peptic digests have been found particularly suitable for the growth of specific microorganisms. It is not necessary to produce media in the field which equal in all respects the special digests which are now employed to obtain luxuriant growth of various fastidious microorganisms, but the problem of making facilities available for growing microorganisms is pertinent and it may be necessary to do so when no peptone is available. Ordinary equipment probably would be available in the laboratory, the common, indispensable reagents such as hydrochloric acid, sodium hydroxide, the phosphates of sodium or potassium, and indicator solutions—bromthymol blue, phenol red, phenolphthalein, methyl red, bromcresol purple—or filter paper impregnated with these indicators.

I. CONCENTRATED BASAL MEDIA

Two types of media which are deemed feasible to prepare in the field may be obtained through digestion of meat or certain meat products by pancreatic or gastric enzymes. Methods for their preparation under field conditions are described below:

a. Procedure for preparation of pancreas (tryptic) digest.

- (1) Place 500 grams of ground meat or heart (any animal, canned meat, or hash may be employed) in some suitable container (sufficiently large tin cans, bottles, or Mason jars have been found satisfactory).
- (2) Add 500 cc. of water (it does not have to be distilled).
- (3) Heat to approximately 80° C., constantly stirring, and continue heating at this temperature for about five minutes, or until the meat becomes chocolate colored. (This is for the purpose of destroying antitrypsin.)

- (4) Add 250 cc. of water, stir, and permit the mixture to cool to a temperature of 50° to 60° C.
- (5) Add 225 to 250 grams of finely ground or chopped pancreas obtained from pig or other animal.
- (6) Adjust the reaction to approximately pH 8.
Note: It is not necessary to have available accurate pH standards. Gillespie double tube standards are suitable, or, if no pH standards are available, satisfactory results will be obtained by merely adding alkali until the mixture is distinctly red to the indicator phenol red and colorless or a light pink to the indicator phenolphthalein, when a drop or two of the pancreas-meat infusion is mixed with a drop of indicator on a spot plate (or in a test tube) or placed on a piece of appropriate indicator paper.
- (7) If the temperature of the infusion has dropped below 50° C., heat it to approximately that temperature, constantly stirring, and maintain it at approximately 50° C. for six to eight hours.
- (8) Make slightly acid with hydrochloric acid, to approximately pH 6.
Note: In the absence of pH standards an acid reaction (yellow) to bromthymol blue and a faint pink to methyl red, determined by mixing a few drops of the digested meat infusion with a drop of indicator or placing on a piece of indicator paper, as previously described, is sufficiently accurate.
- (9) Bring the mixture to a boil, continue boiling for ten minutes, and make up loss due to evaporation with hot water.
Note: The acidification and boiling are for the purpose of facilitating filtration. Approximately 1.2 cc. of concentrated hydrochloric acid have generally been required for 100 cc. of the digest, when employing beef as a substrate.
- (10) Filter through cheesecloth and through coarse paper (or flannel if paper is not available).
- (11) Adjust the reaction of the filtrate to pH 7.2 to 7.6.
Note: From 4 to 5 cc. of N/1 NaOH have generally been found to be required per 100 cc. of this pancreas (tryptic) digest.
- (12) Distribute in bottles, flasks, or other suitable containers, and sterilize at 15 pounds for fifteen to twenty minutes.
Note: This product, which constitutes the concentrated basal pancreas (tryptic) digest medium, is viscid, slightly translucent, with a brownish color resembling beef tea.

b. Procedure for preparation of stomach-mucosa (peptic) digest.

- (1) Place in a bottle or large Mason jar:
 - (a) 500 grams of ground meat or heart (any animal, canned meat, or hash may be employed).
 - (b) 500 cc. of water (does not have to be distilled).
 - (c) 20 cc. of concentrated hydrochloric acid. Stir the mixture thoroughly.
- (2) Add 100 grams of chopped mucous membrane, obtained from the pig or other animal stomach, to the acidified meat infusion.
- (3) Stir thoroughly, heat to approximately 50 C., and place in a 37° incubator for eighteen to twenty-four hours.
- (4) Bring to a boil and continue boiling for five minutes.
- (5) Filter through coarse filter paper or cloth.
- (6) Adjust the reaction to pH 7.2 to 7.6.
Note: About 20 to 25 cc. of N/1 NaOH is generally required per 100 cc. of filtrate.
- (7) Distribute in bottles, flasks, or other suitable containers, and sterilize at 15 pounds for fifteen to twenty minutes.
Note: This product, which constitutes the concentrated basal stomach-mucosa (peptic) digest medium, is viscid, clear, with a light yellowish, fluorescent color.

II. MEDIA FROM CONCENTRATED TRYPTIC AND PEPTIC DIGESTS

It will generally be found that the pancreas and stomach-mucosa digests prepared as described above will contain from 12 to 15 percent solids. Where facilities are available, as in a base laboratory, the concentration of solids may be determined and these digests diluted so as to contain 1 to 2½ percent solids, as may be desired, for growth of different types of microorganisms. For use in the field, however, it may be assumed that the digests contain about 12 percent solids and that dilution to 1 to 10 or 12 will provide a suitable concentration of nutrients (approximately 1 percent solids) for growth of the commonly encountered pathogens of intestinal origin and that dilution to 1 to 5 or 6 (approximately 2 to 2½ percent solids) will be satisfactory for growth of the respiratory tract pathogens.

a. *Media for general use.*

(General bacterial culture media for determination of bacterial counts, indol production, and growth of members of the colon-typhoid group).

- (1) *Broth.* Dilute the concentrated basal pancreas or stomach-mucosa digest medium to about 1 to 10 or 12 with water, adjust the reaction to a desired point if necessary, distribute in test tubes, and sterilize at 15 pounds for fifteen to twenty minutes.
- (2) *Nutrient agar.* For use as a solid medium add 15 to 20 grams of agar-agar per liter of broth prepared as above.
- (3) *Russel double sugar agar.* To 100 cc. nutrient agar prepared as above, add:

(a) Lactose	1.	gram
(b) Dextrose	0.1	gram
(c) K ₂ HPO ₄	0.05	gram

Adjust the reaction to pH 7.4. Distribute in test tubes. Sterilize in autoclave and cool in slanting position.

- (4) *Eosin methylene blue agar.* To 100 cc. nutrient agar prepared as above, add:

(a) K ₂ HPO ₄ (or Na ₂ HPO ₄)	0.1	gram
(b) Lactose	1.	gram
(or 5 cc. of 20 percent solution)		
(c) Eosin (yellowish 2 percent)	2	cc.
(d) Methylene blue (0.35 percent)	2	cc.

Sterilize in the autoclave or pour plates (6 per 100 cc.)

- (5) *Sugar broths.* For detection of acid and gas production.

- (a) Nutrient broth 1000 cc.
 - (b) K_2HPO_4 (or Na_2HPO_4) 1 gram
 - (c) Test carbohydrate 5 grams
 - (d) Bromcresol purple indicator (1.6 percent) 1 cc.
- b. *Media for growth of streptococci, staphylococci, meningococci, and pneumococci.*
- (1) *Liquid medium.* Dilute the concentrated basal pancreas or stomach mucosa digest to approximately 2 to 2½ percent solids (dilution of 1 to 5.) Adjust the reaction to the desired point (generally pH 7.4). Distribute in tubes or flasks and sterilize at 15 pounds for fifteen to twenty minutes.
- Note:* Addition of 0.05 to 0.1 percent dextrose will serve to markedly stimulate the growth of streptococci and pneumococci.
- (2) *Blood agar.* To the above liquid medium (2 to 2½ percent solids without any added dextrose) add:
- (a) 2 grams of agar-agar per 100 cc.
 - (b) Sterilize in the autoclave.
 - (c) Cool to 45° C.
 - (d) Add 3 cc. of blood per 100 cc. of medium, and pour aseptically into tubes (for slants) or into Petri dishes.

III. DIFFERENTIATION OF BACTERIA ON MEDIA MADE FROM PANCREAS AND STOMACH MUCOSA DIGESTS

a. *Broth.* Media corresponding to nutrient broth consist of tryptic or peptic digests diluted to approximately 1 percent solids. Organisms of the colon-aerogenes group, and the genera *Salmonella*, *Shigella*, *Eberthella*, *Proteus*, *Bacillus*, *Pseudomonas*, and *Serratia* grew as luxuriantly as in standard nutrient broth.

Streptococci, staphylococci, and pneumococci grew well, if the concentration of solids was raised to 2 or 2½ percent, and growth was luxuriant if 0.05 to 0.1 percent dextrose were added.

Several members of the colon-typhoid group produced an increase in acidity sufficient to interfere with determination of fermentation in carbohydrate media when employing phenol red or bromthymol blue, and to a lesser extent bromcresol purple, as indicators. Modification of the medium to eliminate this possible source of error is discussed later.

b. *Nutrient agar.* Growth of members of the genera *Salmonella*, *Shigella*, *Eberthella*, *Proteus*, *Pseudomonas*, *Bacillus*, and *Serratia* was generally as vigorous on agar slants made with tryptic and peptic digests (1 percent solids) as on standard nutrient agar. The Shiga bacillus (*Shigella dysenteriae*) grew

more luxuriantly on the tryptic than on the peptic digest medium but growth was not as luxuriant on either of these media as was obtained in agar made from beef heart infusion broth.

c. *Indol*. Employing tryptic or peptic digest broth (1 percent solids) and a temperature of 37° C. with an incubation period of twenty-four hours, detection of indol production with 30 strains observed was as satisfactory as with tryptone broth.

d. *Russel double sugar agar*. On Russel double sugar agar slants made from 1 percent tryptic or peptic digests (1 percent solids) as a base, to which was added 1 percent lactose and 0.1 percent dextrose, and employing phenol red as the indicator, typical and characteristic differential reactions were obtained for members of the genera *Escherichia*, *Aerobacter*, *Proteus*, *Salmonella*, *Eberthella*, and *Shigella*. The small quantity of fermentable substance present in the digests was apparently not sufficient to interfere with the differential reactions.

e. *Eosin methylene blue agar*. On this medium, made with tryptic and peptic digests (1 percent solids) as a base, members of the genus *Escherichia* produced characteristic flat colonies with a distinct metallic sheen and large, dark centers. *Aerobacter* strains also formed typical colonies—confluent, raised, with relatively small brownish to black centers. Members of the non-lactose fermenting genera *Salmonella*, *Proteus*, *Eberthella*, and *Shigella* produced characteristic amber colonies. The vigor of growth seemed to be better on the tryptic than on the peptic digest medium and colonies were somewhat larger than on the standard eosin methylene blue agar. *Shigella dysenteriae*, however, grew slowly, requiring forty-eight hours' incubation, a characteristic which has frequently been observed on the standard eosin methylene blue agar.

f. *Blood agar*. Observations were restricted to a medium made up with the pancreas digest (2.5 percent solids) as a base. Streptococci, staphylococci, and pneumococci grew as luxuriantly and showed characteristic reactions (greening, hemolysis) as on blood agar made with beef heart infusion broth. The meningococcus grew well on tryptic digest blood agar, the colonies of some strains being slightly, though not significantly, smaller than when beef heart infusion was employed as a base.

g. *Detection of fermentation of carbohydrates*. It was previously stated that some members of the colon-typhoid group, when grown in tryptic and peptic digest media, produced an acid reaction which might interfere with the detection of fermenta-

tion of added carbohydrates—a differential criterion which is so important in differentiation of members of the genera *Salmonella* and *Shigella*, particularly in the contingency that a unit is in the field and does not have available specific antisera.

To obviate this difficulty, the acid-producing substance in the digest media may be fermented out, a procedure which is objectionable, especially in the field, because of the added equipment, work, and time which would be required, and particularly because some products of fermentation might be antagonistic to the growth of some microorganisms.

Another possibility, if the quantity of fermentable substance is not too great, might be the addition of a suitable and adequate concentration of a buffer to mask or absorb the small amount of acid produced, but which would not interfere with the detection of acidity formed from added carbohydrates or other desired substrates. The selection of an appropriate indicator might also be helpful.

In table I are summarized observations on acid production in standard beef extract broth and pancreas digest media with and without buffer or dextrose by 12 members of the colontyphoid group. These 12 strains were selected as illustrative of the result obtained with 23 cultures.

In standard beef extract broth (medium A) none of the 12 cultures produced a reaction more acid than pH 7.2 so that they would all be alkaline to the indicator phenol red.

In media B and C, which consisted of pancreas digest (1 and 2 percent solids, respectively) a number of strains produced sufficient increase in acidity to be readily detected by the indicators phenol red or bromthymol blue. Thus, reactions of pH 6.5 to 6.9 were attained by 5 strains in medium B (pancreas digest containing 1 percent solids) and by 10 strains in medium C (pancreas digest with 2 percent solids). This range of acidity is such as to bring the reaction to or beyond the acid end-point of the indicator phenol red and the change in reaction was sufficiently to be observed with the indicator bromthymol blue. *S. flexneri* (Y), *S. ambigua*, *S. sonnei*, and *Esch. coli* produced reactions of pH 6.4 to 6.6 in medium C—sufficiently high to effect some change in color of the bromcresol purple.

In medium A, 11 of the 12 cultures showed no change in reaction or became more alkaline than the control, while one strain produced a rise in acidity of 0.2 pH units. In media B and C, 2 and 5 strains, respectively, produced increases of

0.5 to 1.0 pH units, while 7 and 8 strains, respectively, increased the acidity by 0.3 or more pH units—a change which may readily be observed with the indicators phenol red and bromthymol blue. It is evident that without some appropriate adjustment, media B and C would be likely to cause considerable confusion in determination of acid produced from added fermentable substrates.

TABLE I

Acid production in standard broth and pancreas digest media

Medium	A	B	C	D	E	F
	Standard broth*	Pancreas digest (1% solids)	Pancreas digest (2% solids)	Medium B	Medium B	Medium B
Basal components						
Na ₂ HPO ₄	— — —	— — —	— — —	0.1%	0.1%	0.1%
Dextrose	— — —	— — —	— — —	— —	0.25%	0.5%
Organism	Reaction (pH) after 48 hours at 37° C.					
<i>A. aerogenes</i>	7.4	7.1	6.9	7.3	6.5**	5.3
<i>Esch. intermed'm</i>	7.6	7.1	6.8	7.4	5.7	4.9
<i>Esch. coli</i>	7.6	6.9	6.6	7.5	6.1	5.0
<i>Proteus</i> X19	7.2	6.9	6.8	7.3	5.7	5.5
<i>Proteus</i> KH	7.4	7.0	6.6	7.2	5.9	5.4
<i>S. paratyphi</i>	7.5	7.0	6.9	7.5	5.7	5.0
<i>S. schottmulleri</i>	7.7	7.2	7.0	7.7	5.9	4.8
<i>Sh. ambigua</i>	7.4	6.5	6.4	7.1	5.2	5.2
<i>Sh. dysenteriae</i>	7.5	7.1	7.0	7.5	5.0	5.0†
<i>Sh. flexneri</i> (Y)	7.6	6.7	6.6	7.3	5.2	5.3
<i>Sh. sonnei</i>	7.6	6.9	6.6	7.2	5.0	5.0
<i>E. typhosa</i>	7.6	7.1	6.8	7.5	5.0	4.9
Control	7.4	7.3	7.1	7.4	7.4	7.4
Increase in acidity (in pH units)	Number of cultures					
None (or alkaline)	11	— —	— —	6	— —	— —
0.2 or less	1	5	4	5	—	—
0.3-0.4	—	5	3	1	—	—
0.5-0.1	—	2	5	—	1	—
over 1.0	—	—	—	—	12	12

*Beef extract broth with 1 percent proteose peptone.

**Reaction after 24 hr. pH 5.7.

†Reaction after 24 hr. pH 7.0.

In contrast to the results obtained with these media (B and C) it will be noted that in medium D (which consisted of medium B to which has been added 0.1 percent Na_2HPO_4) the maximum acidity reached by any strain was pH 7.1 which is in the alkaline range of the indicator phenol red. It appears, therefore, that addition of 0.1 percent Na_2HPO_4 (or K_2HPO_4) to medium B would practically eliminate this possible source of error. The results with medium D simulated quite closely those obtained with standard broth. Thus, one strain showed a rise in acidity of 0.3 pH units, five produced an insignificant increase in acidity (0.2 pH units or less), while six of the cultures produced no change in reaction or became more alkaline.

To determine whether the buffer employed would interfere with detection of acidity from added carbohydrates, media E and F were prepared. These consisted of medium D to which were added 0.25 percent and 0.5 percent dextrose, respectively. The most alkaline reaction obtained in medium E, after forty-eight hours at 37° C., was pH 6.5 with a strain of *Aerobacter aerogenes*—an organism which quickly reverts to an alkaline reaction—the reaction after twenty-four hours being pH 5.7. With members of the genera *Salmonella* and *Shigella* the most alkaline reaction obtained in medium E was pH 5.9 which is in the middle of the range for the indicator bromcresol purple and might, therefore, be confusing. The concentration of carbohydrate (0.25 percent) in this medium (E) is, however, only one-half of what is ordinarily employed. On increasing the sugar content to 0.5 percent (medium F), the most alkaline reaction obtained was pH 5.5 by a member of genus *Proteus*, while the strains of *Salmonella*, *Shigella*, and *E. typhosa* produced acidities of pH 4.8 to 5.3—reactions which are markedly acid to bromcresol purple.

Results obtained with stomach-mucosa digest were similar to the above for the pancreas digest media except that the intensity of acid production in the basal medium was not as great. It is evident, therefore, that the addition of 0.1 percent Na_2HPO_4 to a pancreas or stomach mucosa digest containing 1 percent solids will be sufficient to effectively mask or eliminate false acid reactions but will not interfere with the detection of acid production from added carbohydrates.

If hash or canned meat products to which carbohydrate fillers have been added are employed as substrates for digestion, the concentration of fermentable substances may be such as to render the resulting digests unsuitable for fermentation studies.

With meat and heart as ordinarily obtained on the market it has been found that addition of 0.1 to 0.2 percent Na_2HPO_4 or K_2HPO_4 (depending upon whether 1 percent or more solids are present in the digest employed as a base) will produce media suitable for detection of fermentation of added carbohydrates.

SUMMARY

We have discussed the utilization of pancreas and stomach-mucosa digests, in the absence of suitable commercial peptones, for the production of bacterial culture media, simple methods for the preparation of pancreas and stomach-mucosa digests in the field and have presented formulae for the preparation of nutrient broth and blood agars, Russel double sugar and eosin methylene blue agars, and carbohydrate media, employing pancreas or stomach-mucosa digest as a base.

When employing meat or heart as the substrate for digestion, the addition of 0.1 percent Na_2HPO_4 (or K_2HPO_4) to pancreas or stomach-mucosa digests containing 0.1 percent solids eliminated false acid reactions but did not interfere with detection of acid production from added carbohydrate.

Relation of Antisulfonamide Action of Serum to Resistance to Sulfonamide Therapy

FIRST LIEUT. DANIEL A. BOROFF

Sanitary Corps, Army of the United States

That serums of certain individuals have an antisulfonamide action when tested in vitro has been demonstrated in a previous paper.¹ In the present work an attempt was made to correlate this action with the resistance to sulfonamide therapy by certain patients with gonorrheal urethritis.

To that purpose a group of 18 patients with gonorrheal urethritis was selected. Thirteen of them had chronic gonorrhea and had received three or more courses of either sulfadiazine, sulfathiazole, or both, without apparent effect. The other 5 were patients with acute gonorrheal urethritis who showed no resistance to the drug therapy and who, upon receiving one or two courses of sulfathiazole, were completely cured. In all of the

Captain Richard W. Jacobsen, M.C., Chief of the Urology Department, Barnes General Hospital, gave valuable assistance and supplied clinical material. The laboratory staff of the Barnes General Hospital extended the use of their facilities.

1. Boroff, D. A., Cooper, A., and Bullowa, J. G. M.: Inhibition of Sulapyradine in Human Serum, Exudate and Transudate, *J. Immun.*, 43:341, 1942.

resistant cases urethral and prostate smears were positive for gram-negative intracellular diplococci and cultures of the exudates contained gram-negative peroxidase positive diplococci.

From each of the selected patients 25 ml. of blood were taken under sterile conditions and the serums studied for anti-sulfonamide action. The test was performed with varying amounts of each serum diluted in inhibitor-free neopeptone broth. To each tube enough sulfathiazole was added to make the final concentration of the drug 5 mg. percent. Each tube was also seeded to contain about 1,000 organisms per ml. of standardized strain of pneumococcus type 3 which, in inhibitor-free media, is killed in the presence of 1 mg. percent of sulfathiazole in eighteen hours. The cultures were incubated at 37° C. for eighteen to twenty-four hours and the growth determined.

Table I lists the serums tested and demonstrates that all the serums of patients resistant to sulfonamides also showed anti-

TABLE I
Inhibition of sulfathiazole by serums resistant to sulfonamide therapy

Serum		Duration of disease	Grams of sulfonamides received	Dilution of patients' serum					Drug free control
				Whole serum 1:2 1:5 1:10 1:20					
				Growth in 24 hours					
1 H	R.	10 weeks	164	++++	++++	+++	+	—	++++
2 K	R.	5 weeks	156	++++	+++	±	—	—	++++
3 S	N.R.	2 weeks	56	±	±	—	—	—	++++
4 Hi	R.	8 weeks	108	++++	++++	±	—	—	++++
5 E	R.	9 weeks	214	++++	++++	+++	++	—	++++
6 VanM	R.	6 weeks	605	++++	++	++	+	+	++++
7 W	R.	12 weeks	68	++++	+++	+++	++	±	++++
8 Ev	R.	10 weeks	116	++++	+++	+	+	—	++++
9 G	R.	7 weeks	104	++++	++		±		++++
10 St	N.R.	1 week	36	+++	—	—	—	—	++++
11 Str	N.R.	1 week	36	++++	—	—	—	—	++++
12 J	R.	9 weeks	184	++++	+++	++	+	—	++++
13 A	R.	8 weeks	80	+++	+++	++	++	±	++++
14 P	R.	9 weeks	114		++++	++	+	±	++++
15 Ke	R.	14 weeks	410	++++	+++	++	++	±	++++
16 C	R.	8 weeks	62	++++	++++	++	+	±	++++
17 Er	N.R.	1 week	36	++++	+	±	—	—	++++
18 Sm	N.R.	1 week	36	+++	++	±	±	—	++++

R. = Resistant to sulfonamide therapy.

N.R. = Not resistant to sulfonamide therapy.

sulfonamide action when tested in vitro. Some of these serums were still inhibitory when diluted 1 to 20 with inhibitor-free broth. The serums of nonresistant patients either showed this inhibitory power to a far less degree or none at all when these serums were diluted 1:2. The clinical results obtained with patient 18 Sm did not seem to agree with laboratory demonstration of inhibitors in the dilution of 1:2 of his serum. The patient was thought to have been cured after he had received 36 grams of sulfathiazole and cultures and smears made from his urethral discharge were negative for *Neisseria gonorrhoeae*. The case was classified as nonresistant. However, five days after the sulfonamide therapy had been discontinued, cultures and smears made from the prostatic secretion were again positive.

The above results indicate that there may be a relationship between the in vitro manifestation of antisulfonamide action of the serums and the resistance to sulfonamide therapy. The fact that this antisulfonamide action may be measured in the laboratory presents a possibility of predicting the magnitude of the dose of drug necessary for chemotherapy to be effective. Second, the success of the therapy may thus be prognosticated. Third, the potentially resistant cases, instead of being subjected to prolonged and ineffective drug therapy, may be immediately determined in the laboratory, and some other form of therapy applied.

CONCLUSION

The in vitro antisulfonamide action of the serums of certain individuals appears to bear relationship to the clinical resistance of these individuals to drug therapy.



Douglas C-47's over hospital, returning from Tunisia where they dropped paratroops in Rommel's backyard. Official Signal Corps photograph.

Apparatus and Clinical Notes

IMMOBILIZATION OF CERVICAL SPINE FOR TRANSPORTATION

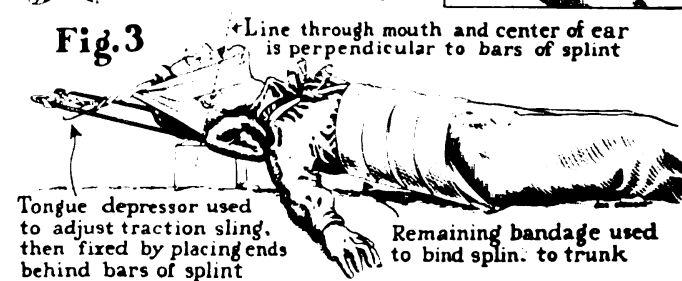
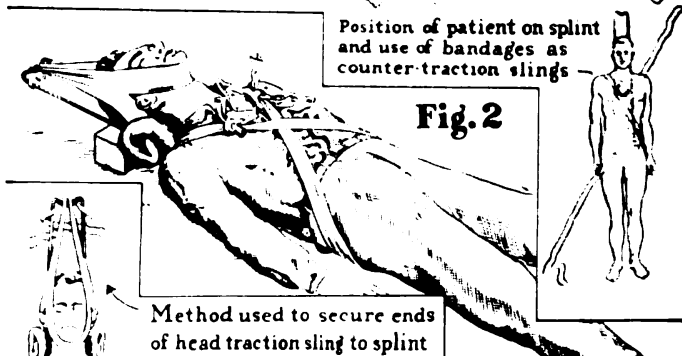
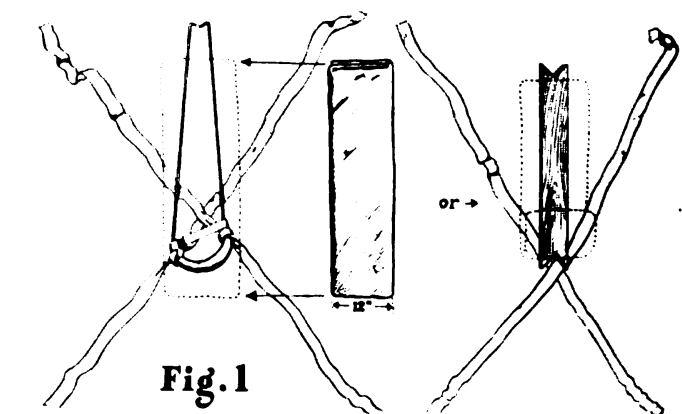
MAJOR T. B. QUIGLEY

Medical Corps, Army of the United States

Injuries to the spinal cord associated with fracture or dislocation of the cervical vertebrae sometimes occur during transportation to a hospital after the original trauma. First-aid manuals as a rule fail to describe a satisfactory method of immobilization. The following method of splinting by traction is recom-

mended for use at the scene of accident. The materials are available in any well-equipped ambulance or can easily be improvised. A hinged half-ring leg splint, a blanket, and three muslin or flannel bandages, 5 yd. long, and 5 or 6 in. wide, are required. A flat board with a notch cut in each end can be substituted for the splint.

The webbing strap is firmly buckled across the wide end of the splint. One of the bandages is unrolled to its full length and cut in two. The mid-point of each $2\frac{1}{2}$ -yard piece is tied with a half hitch to the side bars of the splint at the points of attachment of the half-ring and webbing strap, and the splint placed on the ground with the bandages laid out to form an "X" (figure 1).



The blanket is folded to form a pad about 2 in. thick, 12 in. wide, and the same length as the splint. This is laid in place, extending about 6 in. beyond the half-ring and leaving the narrow end of the splint uncovered. The patient is very carefully and slowly rolled onto the pad with the sacrum over the half-ring and the narrow end of the splint about 12 in. beyond the top of the head. Great care is taken to move the head with the body without flexing or rotating the neck. The ends of the bandages forming the "X" are tied across the body and shoulders (figure 2) and a support a few inches high is placed between the splint and the ground or floor at

the level of the neck. The upper end of the blanket pad is turned on itself toward the splint to form a roll beneath the neck, high enough to place a line through the lips and center of the ear perpendicular to the bars of the splint. A 12-inch slit is cut in the middle of a 6-foot length of bandage. The head is slipped through the slit and the bandage adjusted as a double sling beneath the chin and the back of the skull. The ends of the sling are brought over the narrow end of the splint, back around both bars in opposite directions, and tied to each other.

Traction is produced by twisting the two bandages from the head to the end of the splint with a tongue depressor or stick thrust between them (figure 3). When tension is sufficient to anchor the head and neck firmly, the tongue depressor or stick is fixed by placing both ends behind the bars of the splint. The remaining bandage is used to bind the splint to the trunk below the arms.

When the notched board is used, the procedure is the same except that the 2½-yard lengths of bandage are not tied to the board at their mid-points but are laid out to form an "X" with the point of crossing at and behind the apex of the notch (figure 1).

HERPES FOLLOWING FEVER THERAPY

CAPTAIN RICHARD L. SUTTON, JR.

Medical Corps, Army of the United States

Mechanically induced fever, 106° F. rectally, maintained for seven hours, has been effective in the treatment of chemoresistant gonorrheal infection. During the eighteen hours preceding hyperthermia, the patients received 8.0 grams of sulfathiazole. Herpes developed within the next few days in many of them. A study was made of 60 patients to determine, if present, any relation between the individual's history of herpetic affection and the incidence and severity of herpes that occurred after fever therapy.

TABLE I

History of herpes before fever therapy	Herpes observed after fever therapy				
	None	Minimal	Moderate	Severe	Total
One or more attacks per year for several years	1	6	6	8	21
Once or twice in lifetime	3	5	5	2	15
Never	13	3	7	1	24
Total	17	14	18	11	60

Of the 60 patients who received fever therapy, 43 developed herpes afterward.¹ All had been vaccinated against smallpox within the preceding two years.² In 10 patients, fever therapy was repeated because of failure to cure gonorrhea with the first bout. Of these, 6 developed herpes after the first fever treatment but only 1 developed herpes after

1. Keddle, F. M., Rees, R. B., Jr., and Epstein, N. N.: Herpes Simplex Following Artificial Fever Therapy; Smallpox Vaccination as Factor in Its Prevention, *J. A. M. A.*, 117:1327-1330, 18 Oct. 1941.

2. Ullmann, E. V.: Prevention of Recurring Herpes, *Northwest M.*, 38:15-18, Jan. 1939.

the second. One patient to whom fever treatment was given three times had herpes repeatedly in the past. He suffered from severe herpes after the first fever treatment, none after the second given eleven days later, and moderate herpes after the third given thirteen days after the second.

Comment

Of 17 patients in whom no herpes appeared after fever therapy, 13 belonged to the group in whom herpes had never occurred previously and 16 belonged to the groups in whom herpes had never occurred or had occurred only once or twice. Of 21 patients who had had herpes repeatedly, only 1 failed to develop it after fever therapy. Of 11 instances of severe herpes following fever therapy, 8 involved patients who had herpes repeatedly before receiving fever therapy.

Fourteen instances of moderate or severe herpes following fever therapy occurred in two-thirds of the 21 patients who previously had herpes repeatedly, while 15 instances of moderate or severe herpes occurred in about two-fifths of the 39 patients who never had herpes previously or had it "only once or twice."

Conclusion

Individuals with recurrent herpes appeared, statistically, to suffer more severe postpyrexial herpes than individuals who had never, or only rarely, had herpes.

Patients who after their first fever treatment developed herpes seldom developed herpes after a second fever treatment given within two weeks.

AN IMPROVISED FLUSH TOILET

LIEUT. COLONEL ARTHUR G. KING

Medical Corps, Army of the United States

and

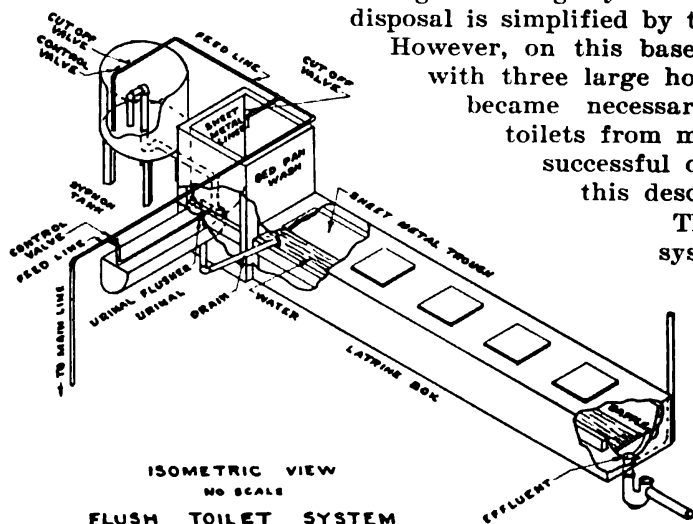
LIEUT. COLONEL RAULIN B. WIGHT

Corps of Engineers, Army of the United States

Hospitals in the field in relatively static positions find the disposal of human waste a difficult problem. Pit latrines are not satisfactory. When the engineering facilities permit piping water through a hospital and constructing a sewerage system with septic tanks, waste disposal is simplified by the use of flush toilets.

However, on this base in the South Pacific, with three large hospitals in operation, it became necessary to improvise flush toilets from material at hand. Their successful operation has prompted this description.

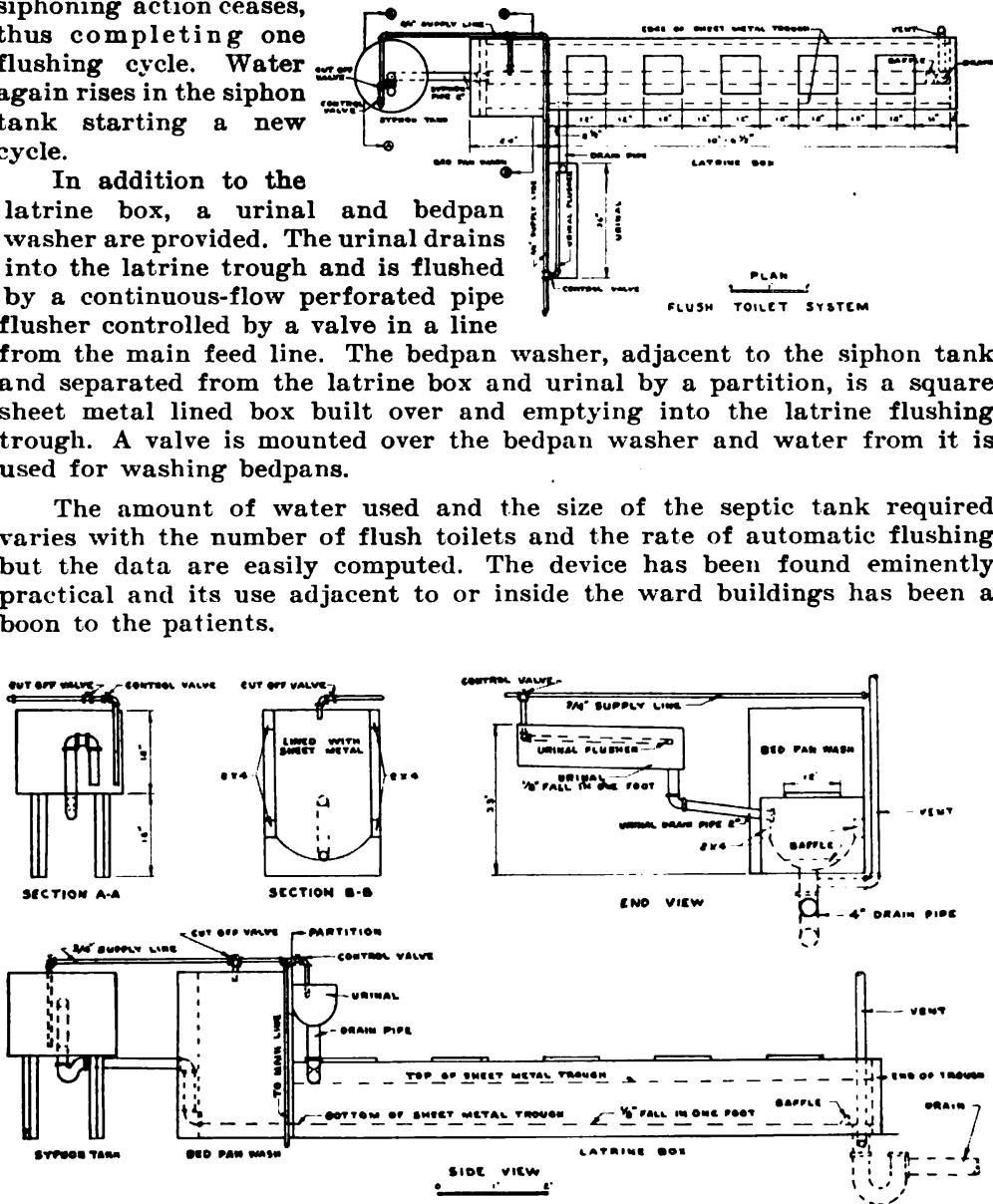
The major elements of the system are a water feed line, control valve, siphon tank, siphon pipe, trap, flushing trough on which latrine box is mounted, and a drain. The system is flushed automatically, the frequency being adjusted by the control valve in the feed line.



As the water level in the siphon tank rises, a point is reached at which the air lock in the siphon produced by the trap below the siphon tank is overcome and siphoning takes place. The volume of water in the siphon tank above the siphon pipe intake then rapidly flows into the sheet metal flushing trough thoroughly flushing it. When the water level in the siphon tank falls below the intake to the siphon pipe, air enters this pipe and siphoning action ceases, thus completing one flushing cycle. Water again rises in the siphon tank starting a new cycle.

In addition to the latrine box, a urinal and bedpan washer are provided. The urinal drains into the latrine trough and is flushed by a continuous-flow perforated pipe flusher controlled by a valve in a line from the main feed line. The bedpan washer, adjacent to the siphon tank and separated from the latrine box and urinal by a partition, is a square sheet metal lined box built over and emptying into the latrine flushing trough. A valve is mounted over the bedpan washer and water from it is used for washing bedpans.

The amount of water used and the size of the septic tank required varies with the number of flush toilets and the rate of automatic flushing but the data are easily computed. The device has been found eminently practical and its use adjacent to or inside the ward buildings has been a boon to the patients.



This improvised flush toilet system is similar in detail and arrangement to the standard flush toilet system shown on drawing No. T.O. 35.41, sheet 4, Office of Chief of Engineers, on which the use of metal custom-built troughs, tanks, and hopper is shown with certain modifications in size of piping, depth of troughs, and in the shape of hopper to permit the use of standard items now in universal use.

URETHRAL STONE IN A THOROUGHBRED MARE

FIRST LIEUT. JOHN L. PUTNAM

Veterinary Corps, Army of the United States.

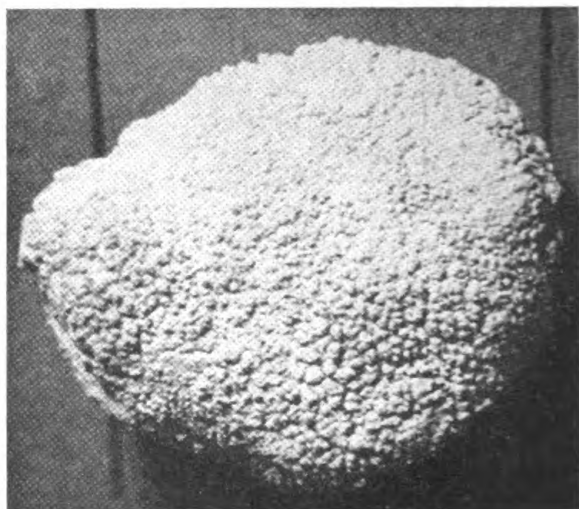
A thoroughbred mare seven years of age, was admitted to sick report on 3 November 1943 with slight discharge from the vulva. Examination revealed a vaginitis and the mare was transferred to a ward for treatment. After flushing the vagina daily with a 2 percent aqueous solution of potassium permanganate for five days the inflammation subsided, treatment was discontinued, and the mare was placed in a paddock for observation. On 15 November the animal showed tenesmus. Examination of the genito-urinary tract with the aid of a metal catheter revealed a calculus in the posterior portion of the urethra. The urethra then was flushed daily with a 2 percent aqueous solution of boric acid.

On 20 November a lithectasy was performed. The standing position was used with stocks for restraint. After proper preparation for operation, 30 cc. of 1 percent procaine hydrochloride solution were injected epidurally. This initial injection failed to give the desired anesthetic. Since the recumbent position was not desired, no more procaine was injected epidurally; instead, 5 cc. of 1 percent procaine solution were injected into the mucosa of the external urethral orifice and 30 cc. of a 3 percent cocaine hydrochloride solution into the lumen of the urethra. This procedure gave proper anesthesia. With a large animal nasal speculum the external urethral orifice was dilated as much as possible; then by rectal manipulations the calculus was moved near the external orifice. An assistant with his hand in the rectum held the calculus in position while the operator using a 10-inch straight volsellum forcep grasped the stone. By manipulations and the injections of liquid petrolatum into the urethra, lithectasy was completed.

As considerable trauma was caused by removal of the calculus, the urethra was flushed daily with 1,000 cc.

of a warm 2 percent aqueous solution of boric acid. The temperature remained normal until 30 November when it rose to 103.2° F. The animal was given 60 gm. of sulfanilamide and 30 gm. of sodium bicarbonate by stomach tube. On the following day the temperature was normal and remained so until 7 December when it was 103.2° F. A similar dose of sulfanilamide and sodium bicarbonate was given. On the following day, the temperature was 104.2° F. Throughout the day a total of 90 gm. of sulfanilamide and 40 gm. of sodium bicarbonate was administered. On 9 December the temperature dropped to 103.2° F. and on that evening 30 gm. of sulfanilamide and 10 gm. of sodium bicarbonate were given. Subsequent temperature readings were normal and no further treatment necessary. The animal was returned to duty 11 February 1944.

The calculus measured 6.2 by 5.1 by 3.2 cm. and weighed 74 gm. It was oval, rough, and light yellow in color. Chemical analysis showed it was composed chiefly of urates and oxalates.



CONSTRUCTION OF A CONVALESCENT WALKER

CAPTAIN CARL S. BAUMAN

Medical Administrative Corps, Army of the United States

The neurological service at this overseas general hospital requested from the medical supply officer a device that would enable or assist a post-operative patient to exercise himself and regain full use of his lower extremities. A self-propelled device was desired, in order to eliminate the need of a ward man who heretofore was necessary to support the patient when he started to walk again.

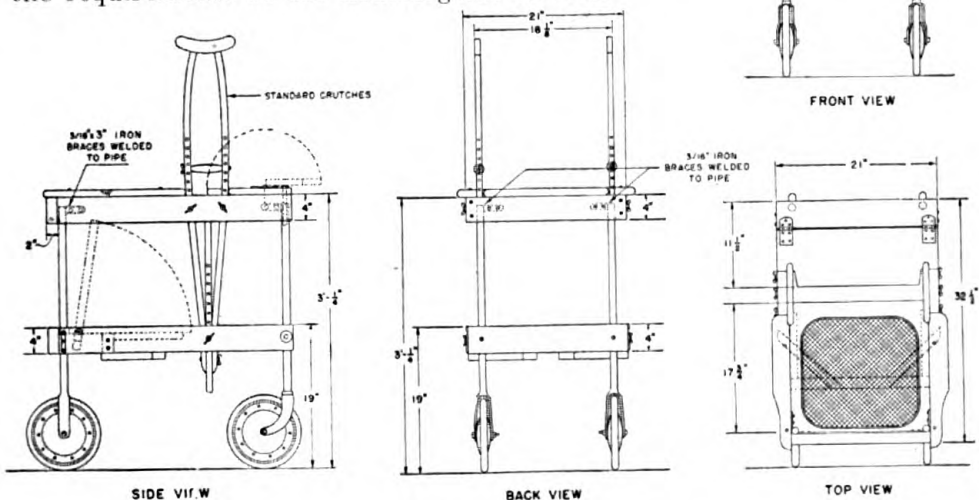


A survey was made of the various medical supply dumps where parts were found that could be used. These parts consisted of a seat and arm rests from a Chair, invalid (Item No. 70430); and wheels and pipe from a Carriage, dressing (Item No. 99165). An old pair of Crutches (Item No. 36630) supplied the other essential parts. The rest of the material was found in the scrap lumber pile.

The lumber used was 1 inch by 4 inches; $\frac{1}{2}$ -inch by 5-inch bolts were used in the removable front section that served as an additional brace, writing table, and serving tray. The seat is

built to swing out of the way of the patient's legs when he is walking. The crutches are adjustable.

The convalescent walker was made as short as possible, in order to be maneuverable in the close confines of a crowded ward. It has been in use constantly. The present type of construction seems adequate in offering the necessary safety and comfort. It appears to fill the requirements of the neurological service.



Hospital dressing carriage parts (wheels and wheel (pipe) upright), wood from scrap, seat and arm rests from wheel chair

FULL LOWER IMPRESSION

CAPTAIN MARC R. CAREY

Dental Corps, Army of the United States

The following technique for constructing a satisfactory full lower denture will be found simple and practicable.

1. Carefully examine the patient's mouth making a note of the consistency of the ridges and the location of all landmarks. A digital examination is made to determine the type of throat form and the maximum height of the labial and lingual frena.

2. Select a suitable tray which may be easily trimmed and bent. It should have sufficient length to cover about two-thirds of the retromolar pad. The flanges should be long enough to carry the impression compound into the folds of the mucosa. The purpose is to secure an overextended primary impression.

3. Modeling compound which has been softened is attached to the tray with the greatest bulk on the lingual and distolingual surfaces. The compound should be flamed, tempered, and tested for heat and should be inserted into the mouth in a stiff and heavy condition. The tray should be carefully centered, pressing downward and backward with the thumbs under the mandible and the forefingers in the bicuspid areas. The compound is carried downward and backward into the throat form area, by digital manipulation if necessary. A steady pressure is maintained until the compound has been cooled with cold water by the dental assistant.

4. The impression is removed and the laboratory technician then pours the preliminary cast in plaster of paris.

5. After examining the mouth and cast, design in pencil the outline form of the impression tray which is to be made on the surface of the overextended cast. The impression tray when designed should allow for the accomodation of the tendons of the buccinator muscles and the labial and lingual frena. The tray should have sufficient length to cover the retromolar pad and the proper length and curvature for the throat form areas. The lowest position of the lingual margin of the tray should be in the bicuspid region. The lingual border should be thick enough for the purpose of beveling the edge of this margin in the direction of the pull of the mylohyoid muscle.

6. One thickness of shellac baseplate is next adapted to the surface of this cast, trimming this baseplate 3 or 4 mm. short of the pencil outline. This layer of baseplate constitutes the spacer which will be removed before taking the final impression. It provides a space inside the tray for the accomodation of a definite amount of impression wax used to form the final impression. The spacer is covered with vaseline, dusted with talcum powder, and the impression tray is formed over this area with two thicknesses of shellac baseplate. The double thickness of shellac baseplate is trimmed to the pencil outline. The tray is removed from the cast, inserted in patient's mouth, and checked for interference with all border tissue. The tray can be trimmed quickly, if any interference is noted, by the use of a carborundum stone on the lathe.

7. An occlusal rim of modeling compound, in the shape of a handle, is added to reinforce the shellac impression tray.

8. The spacer is removed and the procedure for the muscle trimming of the borders is begun. First, add a core of softened stick compound under each heel and in the center of the tray in the anterior region, flame with torch, temper, insert in mouth, and force it into place. Hold the material in this position until chilled and then remove. This facilitates the proper seating of the tray while muscle trimming. Add tracing stick compound

to left buccal border from bicuspid area to the heel, flame with torch, temper, and place in mouth. Muscle trim the impression by an upward and inward movement of the cheek, chill with cold water, and remove from the mouth. The right side is completed in the same manner as the left side. Next add compound to the anterior border, flame with torch, temper, place in patient's mouth, trim by pulling the lip upward and inward, chill, and remove. Examine the impression carefully and, if it is not satisfactory, reheat with a Hanau blow torch any area not properly muscle trimmed and correct any irregularities.

9. The next step is the muscle trimming of the lingual border. Add tracing stick compound to the lingual border between the bicuspid areas, flame with torch, place in the mouth, and have patient protrude the tongue over the lower lip working it from side to side. The patient is then instructed to protrude the tongue strongly into the vault of the mouth. These two movements of the tongue trim the lingual border in this region and ensure muscle trimming for the lingual frenum. The impression is now chilled and removed. Compound is added to the lingual borders of both sides, posterior to the bicuspid areas, flamed with a torch, and placed in mouth. The areas are muscle trimmed by having the patient protrude the tongue over the lip, working it from side to side, and strongly out of each corner of the mouth. The lateral movements of tongue cause the mylohyoid muscle to trim the lingual margin of the impression and should show in the impression, as these muscles have a tendency to pull the lingual margins inward. The lateral movements together with the forward movements of the tongue trim the distal lingual borders by the action of the palatoglossus muscles. The impression at this stage should be stabilized and have suction. If the impression is not stabilized, a correction will have to be made by adding or trimming of the compound where needed, reheating, and making the necessary border adjustments.

10. The impression is now post-dammed by the addition of Mayco green boxing wax over the retromolar pad and down over the distal lingual border. A piece of wax, about $\frac{1}{8}$ - to $\frac{1}{4}$ -inch wide and of sufficient length, is then softened and sealed to impression tray. The impression is inserted into the mouth, forced into place, and the distolingual border is muscle trimmed where the wax was added as previously described in trimming this border when compound was added. It is chilled and removed from the mouth. If necessary trim off excess wax, reinsert, and muscle trim again.

11. Next cut out compound stops and all compound overlapping into the spacer area except that at the distal border of the tray.

12. The impression wax is now ready for use which will give uniform adaptation over the entire surface of the impression without overloading any area. The use of a spacer relieves the pressure of the finished denture from the crest of the ridge. After the impression tray has been dried, paint several layers of impression wax over the entire surface of the tray with a camel's-hair brush, carry to patient's mouth, center over the ridges and seat the impression with pressure in the bicuspid regions. The pressure is maintained about four minutes. Next trim all border tissue buccally, labially, and lingually as previously described. The impression is chilled with cold water and removed from the mouth by a slight teasing movement to avoid injuring the margins. If the impression does not show uniform pressure over all areas, correction can be made by the addition of more wax with the brush and repeating the procedure. If the technique has been followed carefully, the finished denture should be stabilized, with good adaptation, and margins resting on soft tissue. The patient should not be able to dislodge the impression by any normal movement of the tongue or lips.

Comment

A complete digital and visual examination is necessary. Chair time is reduced to forty-five minutes, while from five to ten minutes of this time are required to take the overextended preliminary impression and to outline the tray on the preliminary model. The rest of the time is used in trimming the tray, muscle trimming, and taking the final wax impression. All other procedures are accomplished by the laboratory technician. Fewer adjustments of the finished denture are necessary in the technique, thereby saving the time of the operator and patient. The use of a spacer and the final impression in wax assure the equalization of tissue tension thus avoiding overloaded areas. Individual, properly outlined, impression trays and muscle trimming with modeling compound assure one of denture margins that harmonize with the function of the muscles involved. The impression wax used in this technique is described by Lynn C. Dirksen, D.D.S., Iowa City, Iowa, February 1939, in the *Journal of the American Dental Association*.

This procedure has been used daily for the last eighteen months, during which time more than three hundred lower dentures have been constructed with uniformly excellent results.

Interchange of Medical Knowledge.—The United States, through the Office of the Coordinator of Inter-American Affairs, found it necessary to organize a corporate medium as a channel for collaboration in working with the other Americas in wartime health and food projects. This entity is the Institute of Inter-American Affairs. Corresponding agencies have been set up in most of the other countries participating in the health work. These agencies are integral parts of the governments of the respective countries. They represent the creation of additional government facilities for health and sanitation work. They especially represent the extension of inter-American cooperation in the field of health and sanitation. These new agencies are known in the American republics as inter-American cooperative health services.

Further, the wartime work has brought about a large and mutually beneficial exchange of professional knowledge among the Americas. Some 200 United States doctors, sanitary engineers, and other specialists have been assigned to neighboring republics by the Institute of Inter-American affairs. Mostly they take to these countries specialized knowledge and experience in tropical medicine, in sanitation, and in medical practice. They work with the 3,200 doctors, engineers, and technicians of the other Americas who comprise the bulk of the professional and technical skill in the inter-American program. Altogether, more than 13,000 persons are at work in the program.

In addition, 125 doctors, engineers, and medical specialists have been invited to the United States by the Institute of Inter-American Affairs for advanced studies and training, for the observation of our practices in in medicine and sanitation. Doctors in the United States find new opportunities for study of tropical diseases and special medical problems in Latin America. The result is extensive interchange of medical knowledge among the Americas. It is logical to expect this will lead to more uniformity in public health work in the hemisphere, which will simplify the problems of inter-American cooperation in the control of disease. (Brigadier General George C. Dunham, U. S. A.: Health Work in Hemisphere Development; press release 18 Feb. 1944, Office of Coordinator of Inter-American Affairs.)

Index

	<i>Page</i>
Army Nurse Corps Increased, Strength of.....	16
Awards to Medical Department Personnel.....	35
Blinded, War, Social Adjustment of the.....	8
Cheese	22
Culture Media in the Field, Preparation of.....	103
Current List of Medical Literature.....	15
Dentistry in the Chinese Army.....	42
Diarrheal Diseases in U. S. Troops in Belgian Congo.....	76
Directives and Publications Other Than S. G. O., Recent.....	37
Dressings, Gauze, Device for Making.....	83
Epidemic Diseases, Board for Investigation and Control of.....	19
Equipment, Maintenance of Medical.....	21
Extremities, Early Postoperative Mobilization of Lower.....	17
Fibrinogen and Thrombin, Clinical Uses of Products Made from Human	53
Flies in Latrines.....	18
Fungi, Method for Slide Culture of.....	18
Fungous Diseases, Diagnostic and Registry Center.....	15
Gas Casualty Set, The New.....	12
Gonorrhea, Sulfathiazole for the Prevention of.....	97
Hand-Washing Device	43
Herpes Following Fever Therapy.....	115
Hookworm Infection in the Pacific Area.....	3
Horse Breeding	23
Hospital Train in Australia.....	6
Impression, Full Lower.....	120
Induction Station Examinations, Importance of Adequate Records of..	29
Induction Station Examinations, Results of.....	27
Jellyfish, Treatment of Sting of.....	31
Litter Bearers Brought Down the Wounded.....	26
Medical Knowledge, Interchange of.....	122
Meningococcic Infections, Complications of.....	68
Milk, Re-pasteurized	34
Milk, Thermophilic Bacteria in.....	11
Museum, Dedicate Field Equipment.....	9
Neuropsychiatrist and Convalescent Training Program of Army Air Forces	93
Neuropsychiatry, Military, Current Trends in.....	44
Neurosyphilis Treatment and Disposition Centers.....	20
Nurse's Aides, Army.....	34
Nurses Awarded the Purple Heart, Eight.....	32
Parachute Injuries, A Study of.....	57
Patients Moved by Air.....	7
Physiotherapy Clinic in the Jungle.....	32
Plague in the Netherlands East Indies.....	17
Psychoneurosis on March of Time, Broadcast on.....	40
Reconditioning Conference, The Fourth.....	4
Reconditioning Problem at Oliver General Hospital.....	81
Respiratory Diseases, Research on Prevention of.....	1
Rh Factor, Clinical Significance of the.....	50
Spine for Transportation, Immobilization of Cervical.....	114
Suction Apparatus, Improved.....	25
Sulfonamide Therapy, Relation of Antisulfonamide Action of Serum to Resistance to	111
Thrombin; Clinical Uses of Products Made from Human Fibrinogen and	53
Toilet, An Improvised Flush.....	116
Tropical Medicine Fellowships.....	2
Typhus Fever in 1943, Endemic	24
Urethral Stone in a Thoroughbred Mare.....	118
Walker, Construction of a Convalescent.....	119
Water Heater, Improved.....	39

